

2019

Missouri Furbearer Program Annual Report



Missouri Department of Conservation

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Prepared by:

Laura Conlee — Resource Scientist

Suzanne Johnston — Wildlife Biologist

Cristina Macklem — Wildlife Biologist



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Annual Highlights

- 🐾 Three new furbearers with record-weights were identified during the 2018-2019 season. This included a red fox weighed in at 13 pounds 5.7 ounces, a river otter that weighed in at 32 pounds 11.2 ounces, and a striped skunk that weighed in at 9 pounds 14 ounces. See the complete list of Record Furbearers on page 49 for more information.
- 🐾 Bear observations continue to increase as the black bear population grows and expands into new areas of the state.
- 🐾 The Missouri Black Bear Project Storymap is updated annually. The 2019 update included information about tracking observations and human-bear conflict and how to Be Bear Aware in Missouri.
- 🐾 Preparations are being made to train Master Naturalist volunteers to assist with the annual Furbearer Sign Station Surveys in 2019.
- 🐾 The 2018 Bow Hunter Observation survey revealed that hunters spent **91,936 total hours** in the stand, which is the second highest recorded hours in the history of the survey.
- 🐾 Two mountain lions were confirmed in the state following genetic testing of deer and elk kills, and one wolf was confirmed in the state after it was discovered dead likely following a vehicle collision.
- 🐾 This year, the Missouri Department of Conservation hosted the 24th annual Eastern Black Bear Workshop in Potosi, Missouri. The conference was attended by vendors, academics, and professionals from state and federal agencies from across the United States and abroad. Topics included innovative harvest strategies, new research techniques, outreach and education, human-bear conflict, disease and mortality, and bear resistant trash cans. Additional working groups, outdoor demos, and poster presentations were also held.

Introduction

Missouri's wild fur market has been monitored annually since 1940, with some information dating back to 1934. Over time, tremendous fluctuations in the harvest of Missouri's primary furbearing species have been observed as both market and social trends changed. The Missouri Department of Conservation (MDC) monitors the fur market within the state using mandatory fur dealer transaction records, mandatory pelt registration of bobcats (since 1980) and river otters (since 1996), and information gathered at fur auctions. The information in this report is based on the harvest by both trappers and hunters.



The number of Fur Dealer Permits issued by MDC peaked at 1,192 during the 1945-46 trapping and hunting season. In 2019, MDC issued **31 Resident Commercial Fur Buyer Permits**, five less than were issued in 2018, and **10 Non-Resident Commercial Fur Buyer Permits**, four more than were issued in 2018.



Permits to harvest Missouri furbearers by trapping methods were first required in 1953. The number of issued Resident Trapping Permits peaked during 1980-81 at 13,248 and reached an all-time low in 2000-01 at 2,050 permits issued. During the 2018-19 trapping season, MDC issued **6,554 Resident** and **402 Non-Resident Trapping Permits**.

The highest peak of total pelts harvested reached 834,935 in 1940-41 (over 70% were opossum and skunk pelts) and reached the second highest peak in 1979-80 at 634,338 when average raccoon pelt values were estimated at \$27.50. The economic value of harvested fur also peaked in 1979-80 at over \$9 million. Pelt values declined dramatically during the late 1980s and through the mid-1990s. As a result, the number of participants also fell to all-time lows. The global fur market is uncertain at this time with auction houses having dealt with falling markets for years, but promising increases in sales and prices for many species this year (NAFA, 2019; FHA, 2019). China and Russia are still some the most promising markets for wild fur, but the current political and economic climate has created some uncertainty this year. Overproduction of ranch-raised fox and mink has had direct effects on wild fur markets, especially wild mink, muskrat, otter, and wild fox (NAFA, 2019). Coyote pelts sold particularly well this year and continue to be strong in the international fur market despite the trends of uncertain and falling fur markets (NAFA, 2019; FHA, 2019).

In addition to harvest information, wildlife population trends are monitored using observations collected by MDC staff (Sign Station Survey) and bow hunters (Archer's Index). Sign station surveys are conducted each September and October by MDC staff in 25 counties. The Archer's Index is based on annual wildlife observation reports submitted by cooperating bow hunters. A more detailed account of this year's Sign Station Survey and Archer's Index can be found in **Section II** of this report.



Also contained in **Section II** are updates and progress summaries for various furbearer-related research projects, monitoring efforts, and items of interest. **Section II** is for informational purposes and these should be considered preliminary reports. For more information on any of these reports, please contact Laura Conlee at Laura.Conlee@mdc.mo.gov.



SECTION I: Missouri Furbearer Status 2018 - 2019



Fur Harvest Comparisons

Individuals interested in buying or selling fur in Missouri (i.e., fur dealers) must obtain a commercial permit from MDC. Permit requirements include maintaining and submitting records of all fur transactions (e.g., buying, selling, retaining inventory, etc.). Data collected from fur dealers provide MDC an estimate of furbearer harvest. Additionally, bobcat and river otter harvest numbers are gathered from mandatory pelt registration, including tagging, as required by CITES for export outside the United States.

Excluding this year, pelt prices had steadily declined for the last four seasons, resulting in reduced harvest for most species. MDC issued a total of **6,956 trapping permits** for the 2018-19 trapping season, a decrease in number issued from the previous season (Table 1). Overall, fur buyers continue to house high inventories of all species and pelt prices continue to be relatively low; therefore, the 2019-20 season will likely be similar to the last few years unless the global fur market changes.



Table 1. Furbearer harvest and pelt prices in Missouri over the last three harvest seasons.

Species	Pelts sold ¹ or registered* (2018-19)	Pelt Prices from MTA Auctions ² (2018-19)	Pelts sold or registered* (2017-18)	Pelt Prices from MTA Auctions ² (2017-18)	Pelts sold or registered* (2016-17)	Pelt Prices from MTA Auctions ² (2016-17)
Raccoon	22,562	\$5.04	26,340	\$4.86	32,106	\$2.77
Opossum	593	\$2.31	1,296	\$1.57	1,176	\$1.74
Muskrat	3,344	\$4.69	6,590	\$2.95	10,205	\$3.60
Coyote	5,164	\$22.43	5,177	\$13.66	6,586	\$12.52
Beaver	2,094	\$9.59	2,644	\$6.42	3,522	\$6.90
Mink	163	(m) \$9.12 (f) \$3.00	299	(m) \$7.87 (f) \$5.00	356	(m) \$10.71 (f) \$5.00
Red Fox	562	\$15.99	812	\$15.24	587	\$22.75
Gray Fox	242	\$15.54	434	\$12.80	293	\$12.33
Striped Skunk	156	\$1.50	197	\$3.11	354	\$5.50
Badger	18	\$29.00	15	\$23.75	1	\$18.00
Bobcat*	2,161	\$47.51	3,018	\$29.48	2,317	\$34.99
River Otter*	1,412	\$29.90	2,025	\$23.46	1,602	\$30.79
Trapping permits issued	6,956		7,573		7,341	

¹ Number of pelts sold is based on reports received from 41 Fur Dealer Permittees.

² Pelt prices are averaged from all fur sold, including green, finished, and damaged furs.

* Bobcat and River Otter harvest numbers are based on CITES registration.

- No information available.

Missouri Fur Auction Prices



The Missouri Trappers Association (MTA) hosts fur auctions each year in the state of Missouri, providing opportunity to buy or sell harvested pelts. In the 2018-19 season, MTA hosted just one auction in February. Pelt prices are averaged from all fur sold, including green, finished, and damaged furs. Overall, average pelt prices increased by about 28% from last year (Table 2). Coyote, bobcat, and muskrat exhibited the greatest increase in average pelt price from last year with 64%, 61%, and 59%, respectively. Striped skunk was the only species to show a decline in average pelt price from last year with -52% change. Pelt prices were still lower, however, than peak prices in 2012-2013. When controlling for the very low price of badger pelts in 2012-2013, average pelt prices in 2018-2019 were 69% lower than in 2012-2013. After steady declines in pelt prices since price peaks in 2012, pelt prices this year were an average of \$8.66 higher than the five-year average (Table 3). The average pelt price for Virginia opossum, muskrat, coyote, beaver, gray fox, bobcat, and otter were all above the five-year average.

Table 2. Furbearer pelt prices in Missouri from the annual Missouri Trappers Association Fur Auction 23 February 2019, Montgomery City, Missouri.

Species	Total Sold 2018-19	Average Pelt Price 2018-19	Change from 2016-2017	Change from Peak in 2012-2013
Raccoon	2,321	\$5.04	3.70%	-75.76%
Virginia Opossum	49	\$2.31	47.13%	84.80%
Muskrat	897	\$4.69	58.98%	-60.22%
Coyote	334	\$22.43	64.20%	0.76%
Beaver	260	\$9.59	49.38%	-55.85%
Mink	22	\$8.84	22.61%	-63.24%
Red Fox	59	\$15.99	4.92%	-59.14%
Gray Fox	41	\$15.54	21.41%	-55.24%
Striped Skunk	1	\$1.50	-51.77%	-53.85%
Badger	2	\$29.00	22.11%	*7531.58%
Bobcat	72	\$47.51	61.16%	-58.87%
River Otter	118	\$29.90	27.45%	-65.04%

* Change in Badger pelt price is artificially inflated because average pelt price in 2012-2013 was \$0.38 and very few pelts were sold.

Table 3. Comparison of average Missouri Trappers Association Fur Auction prices over the last five trapping seasons with a five-year average.

Species	2018-19	2017-18	2016-17	2015-16	2014-15	5-year Average
Raccoon	\$5.04	\$4.86	\$2.77	\$5.84	\$7.75	\$5.25
Virginia Opossum	\$2.31	\$1.57	\$1.74	\$0.64	\$1.80	\$1.61
Muskrat	\$4.69	\$2.95	\$3.60	\$2.37	\$5.58	\$3.84
Coyote	\$22.43	\$13.66	\$12.52	\$12.18	\$18.14	\$15.79
Beaver	\$9.59	\$6.42	\$6.90	\$10.94	\$11.11	\$8.99
Mink	\$8.84	\$7.21	\$9.52	\$10.47	\$11.18	\$9.44
Red Fox	\$15.99	\$15.24	\$22.75	\$16.34	\$24.81	\$19.03
Gray Fox	\$15.54	\$12.80	\$12.33	\$15.72	\$18.47	\$14.97
Striped Skunk	\$1.50	\$3.11	\$5.50	-	\$3.83	\$2.79
Badger	\$29.00	\$23.75	\$18.00	-	\$32.67	\$20.68
Bobcat	\$47.51	\$29.48	\$34.99	\$34.74	\$60.08	\$41.36
River Otter	\$29.90	\$23.46	\$30.79	\$25.53	\$34.97	\$28.93

- No information available



Raccoon Harvest and Population Trends

Raccoon harvest in 2018-19 totaled 22,562 and included individuals harvested by both trapping and hunting methods (Figure 1). This year's harvest was down 14.34% from last year. Harvest is down 29.73% from two years ago, despite two years of increasing pelt prices. The 2018-19 season resulted in the lowest raccoon harvest since 1942 and the longest duration of decline in harvest numbers over the last 25 years with seven consecutive years of decline. Average raccoon pelt prices increased by 3.7% this year from 2017-18 but are still just a quarter of the last price peak in the 2012-13 season.

Population trends are derived from the Bowhunter Observation Survey and Furbearer Sign Station Survey. For a detailed description of these surveys, see Section II of this report. During the hunting season of 2018, bowhunters submitted the number of raccoons observed during archery hunting hours and the number of hours spent afield. Based on these observations, the number of raccoons sighted per 1,000 hours



decreased by 27% to 35.0 in 2018 from 48.5 in 2017 (Figure 2). Presence of raccoon tracks at furbearer sign stations also decreased slightly to an index of 176 in 2018 from 185 in 2017 (Figure 3). Although raccoon abundance data is based on trend information, multiple surveys indicate an overall increasing trend in population abundance. Short-term fluctuations are normal and expected due to the dynamic nature of raccoon populations. Based on harvest and pelt prices of previous trapping and hunting seasons, harvest pressure is expected to remain stable for the 2019-20 season.

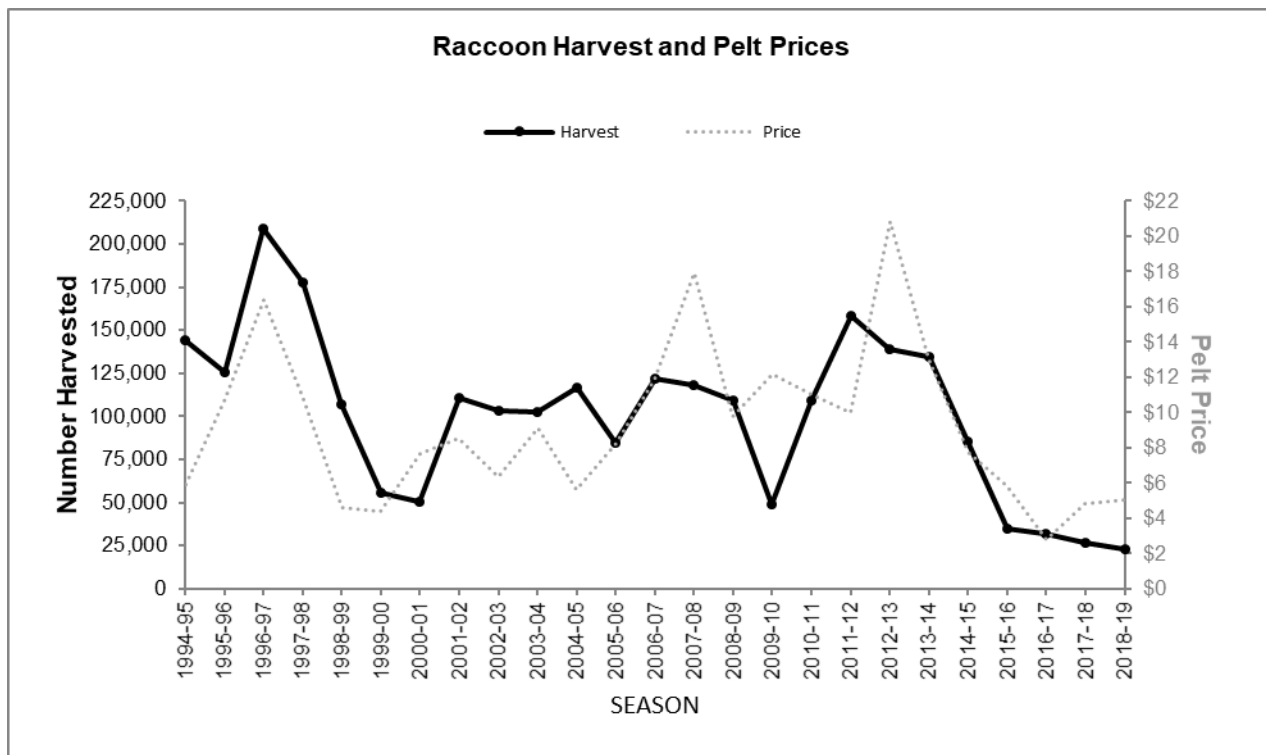


Figure 1. Comparison of Missouri raccoon harvest and pelt prices over the last 25 years. Harvest estimates are derived from fur buyer records. Annual pelt prices are the average price from the Missouri Trappers Association Fur Auction.

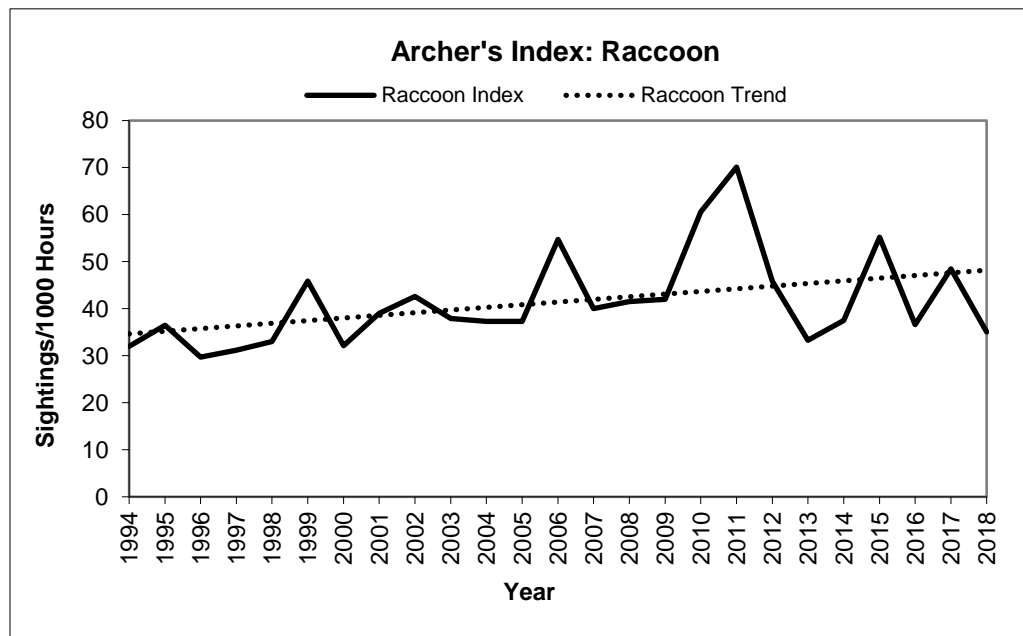


Figure 2. Raccoon population trends based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

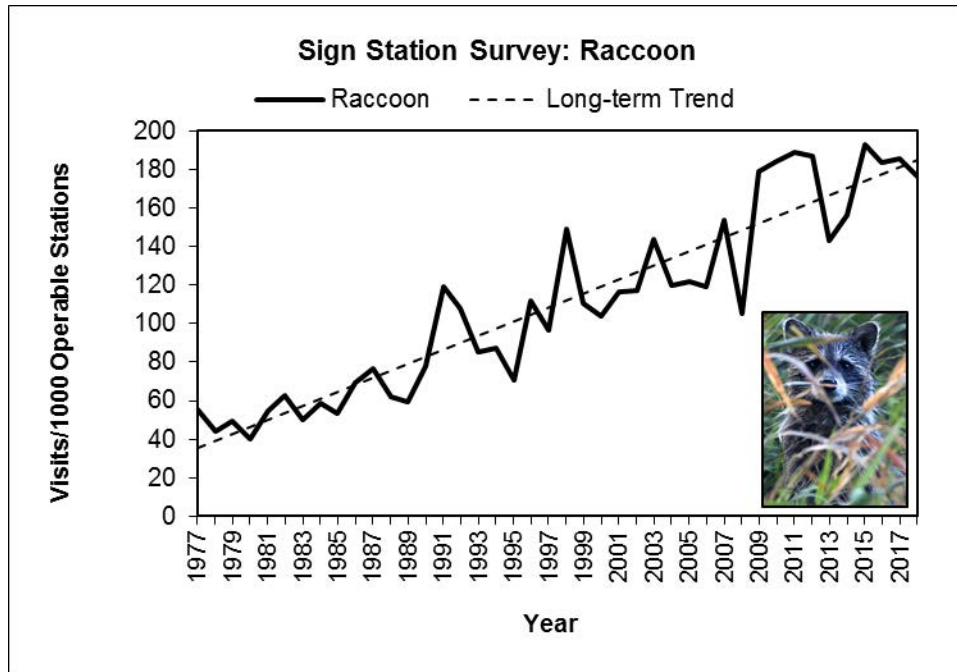


Figure 3. Missouri raccoon population trends based on the Furbearer Sign Station Survey Index.



Virginia Opossum Harvest and Population Trends

Virginia opossum harvest in 2018-19 totaled 593 and with most individuals harvested by trapping (Figure 4). This year's harvest was down 54.24% from last year's harvest of 1,296 individuals. Harvest is down 49.57% from two years ago, despite a continued increase in pelt prices from the 2015-16 low of \$0.64. Average Virginia opossum pelt prices for 2018-19 increased 47.13% and are the highest pelt prices for the species since the start of records in 1982. The 2018-19 season also resulted in the lowest Virginia opossum harvest on record.



Population trends are derived from the Bowhunter Observation Survey and Furbearer Sign Station Survey. For a detailed description of these surveys, see Section II of this report. Based on bowhunter observations, the number of Virginia opossums sighted per 1,000 hours decreased by 29% to 8.4 in 2018 from 11.8 in 2017 (Figure 5). Presence of Virginia opossum tracks at furbearer sign stations also decreased slightly to an index of 108 in 2018 from 147 in 2017 (Figure 6). Despite these observations, the long-term population trend data from surveys suggest populations are stable and increasing slightly over time.

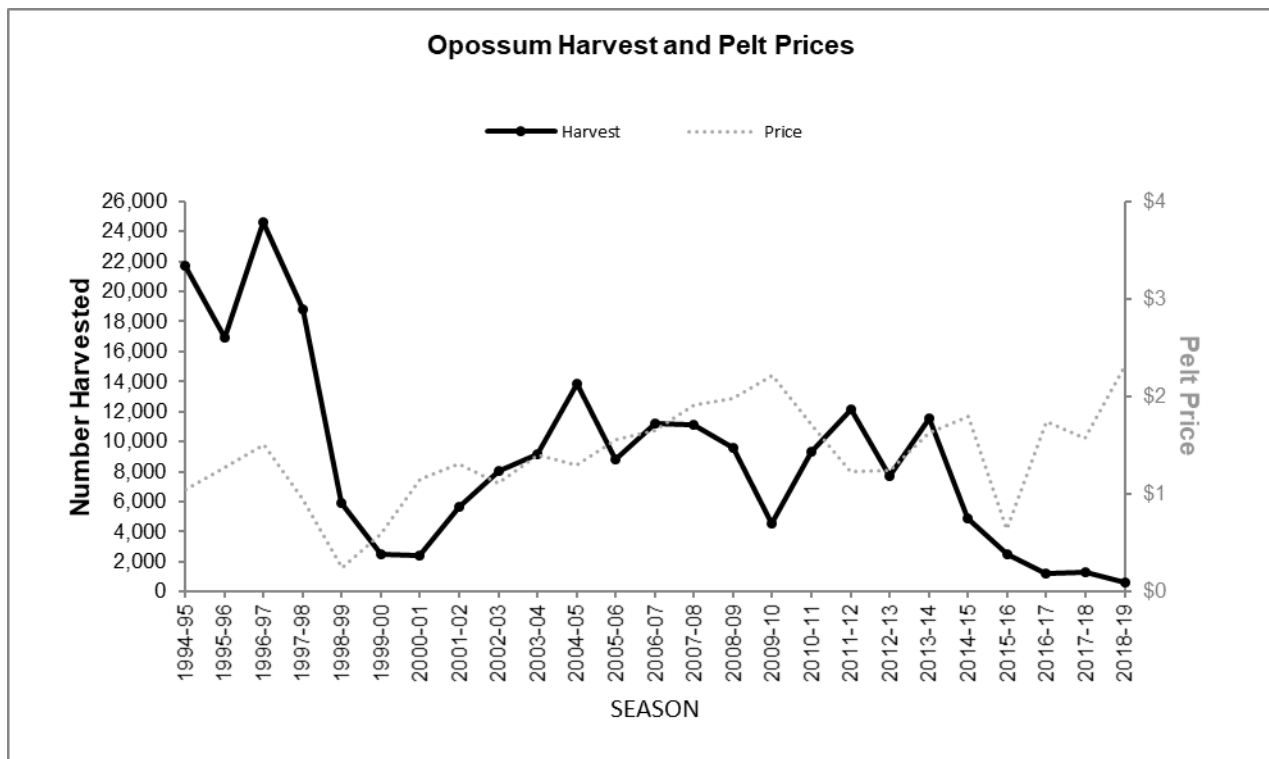


Figure 4. Comparison of Missouri Virginia opossum harvest and pelt prices over the last 25 years. Harvest estimates are derived from fur buyer records. Annual pelt price estimates are the average price from the Missouri Trappers Association Fur Auction.

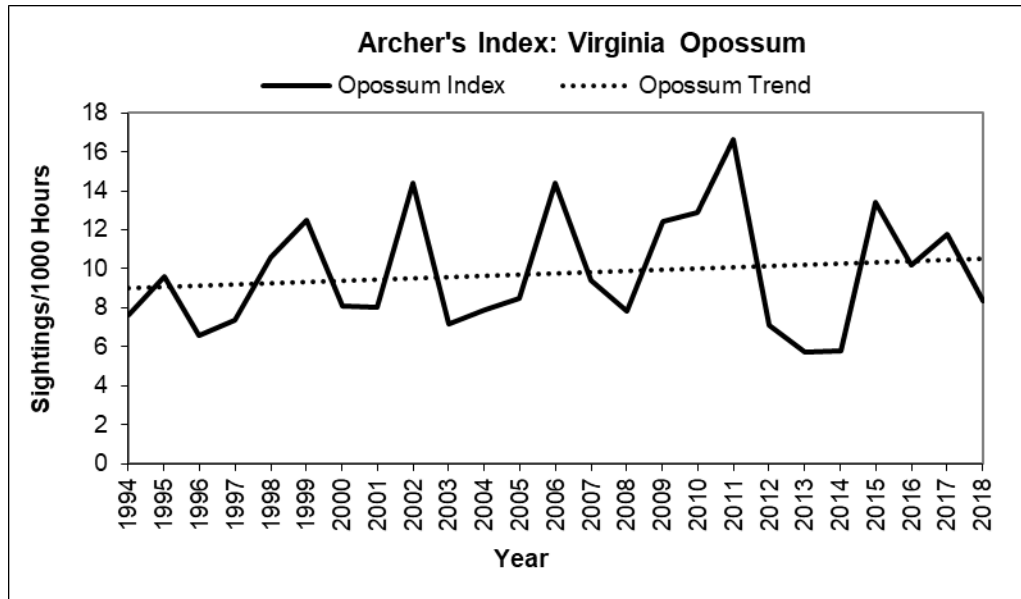


Figure 5. Virginia Opossum population trends based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

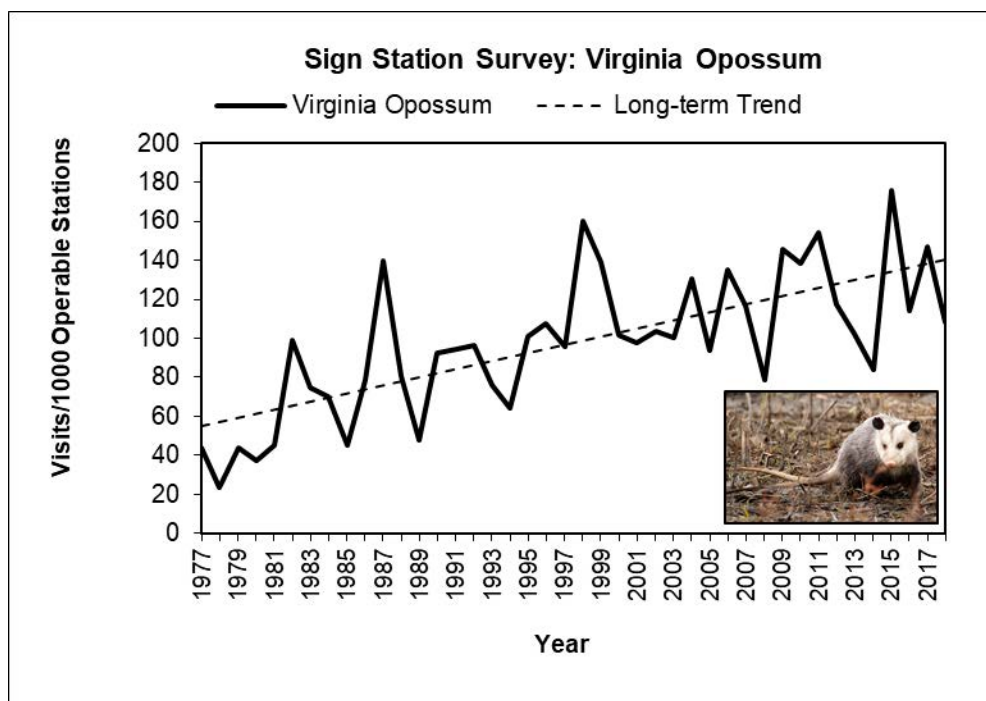


Figure 6. Missouri Virginia opossum population trends based on the Furbearer Sign Station Survey Index.

Coyote Harvest and Population Trends

Coyote harvest, based on Commercial Fur Buyer reports, during the 2018-19 furbearer season was only down 0.25% from the 2017-18 season with 5,164 individuals harvested (Figure 7). Predator hunting continues to increase in popularity, and survey data suggest over 25,000 people still hunt coyotes annually. Many trappers enjoy the challenge of catching coyotes, and this is reflected in the harvest totals. Additionally, the use of cable restraints has increased opportunity for coyote harvest, supplying both the fur and live markets. Coyote pelt prices averaged \$22.43 this year. However, coyote pelts are becoming increasingly popular in the international fur market, which may influence the local market for this species (NAFA, 2019; FHA, 2019).



Population trends are derived from the Bowhunter Observation Survey and Furbearer Sign Station Survey. For a detailed description of these surveys, see Section II of this report. Population trend data from the Archer's Index (Figure 8) and sign station survey (Figure 9) for coyotes suggest populations are stable. However, the coyote population appears to be on a slight increase since the 1970s when the Sign Station Survey began and the early 1980s when the Archer's Index began.

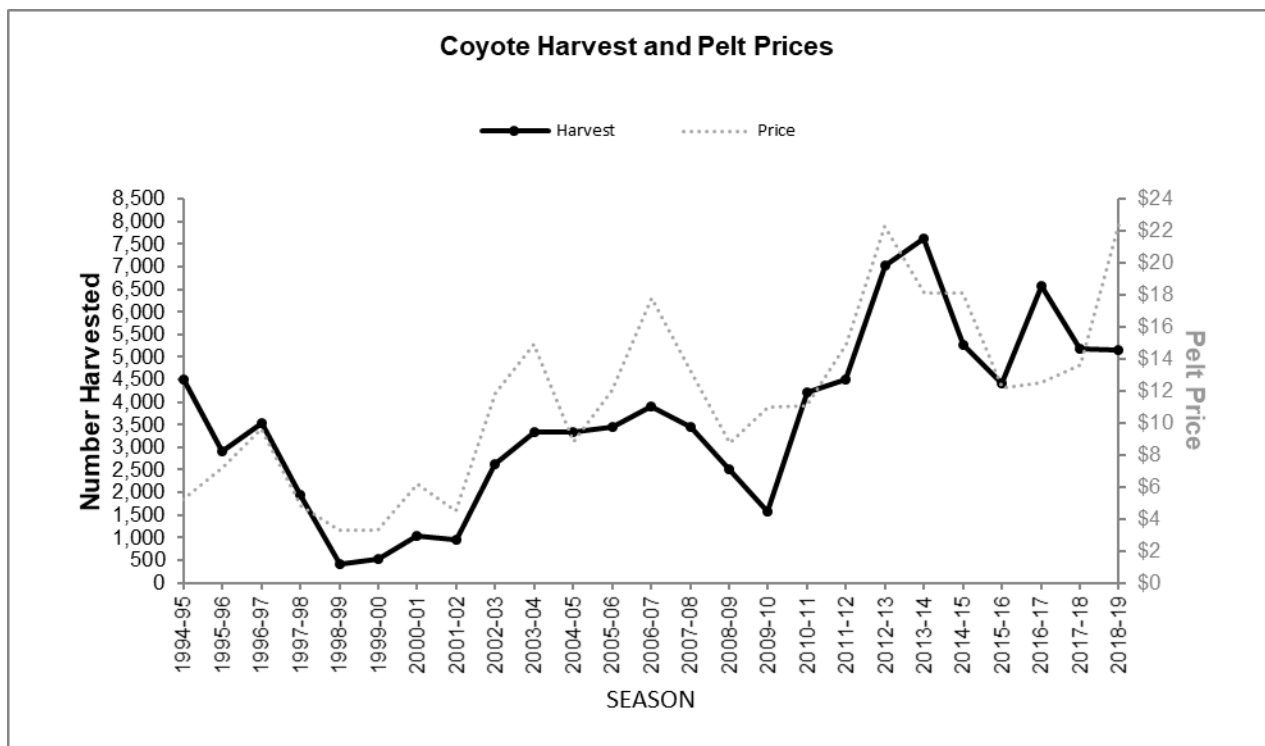


Figure 7. Comparison of Missouri coyote harvest and pelt prices over the last 25 years. Harvest estimates are derived from fur buyer records. Annual pelt price estimates are the average price from the Missouri Trappers Association Fur Auction.

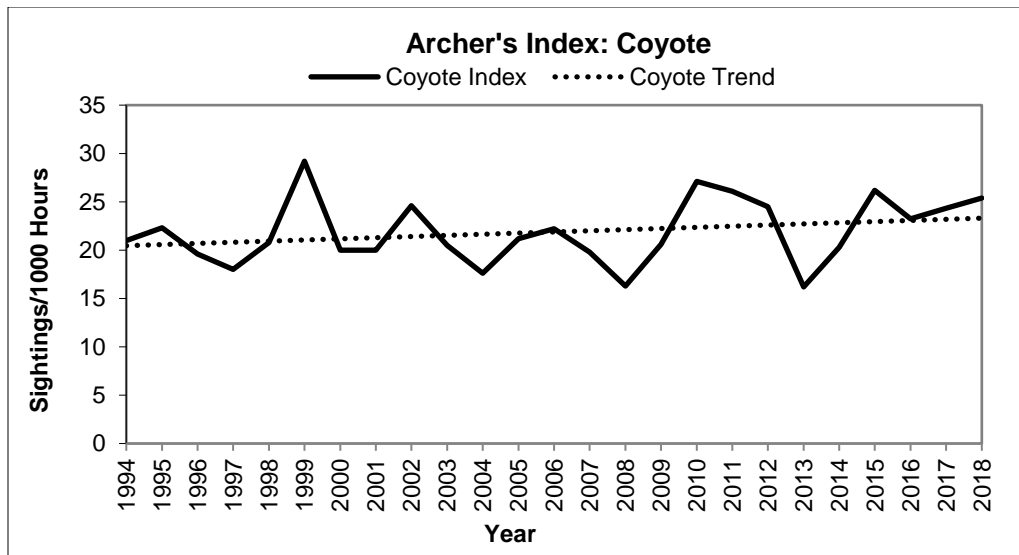


Figure 8. Coyote population trends based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

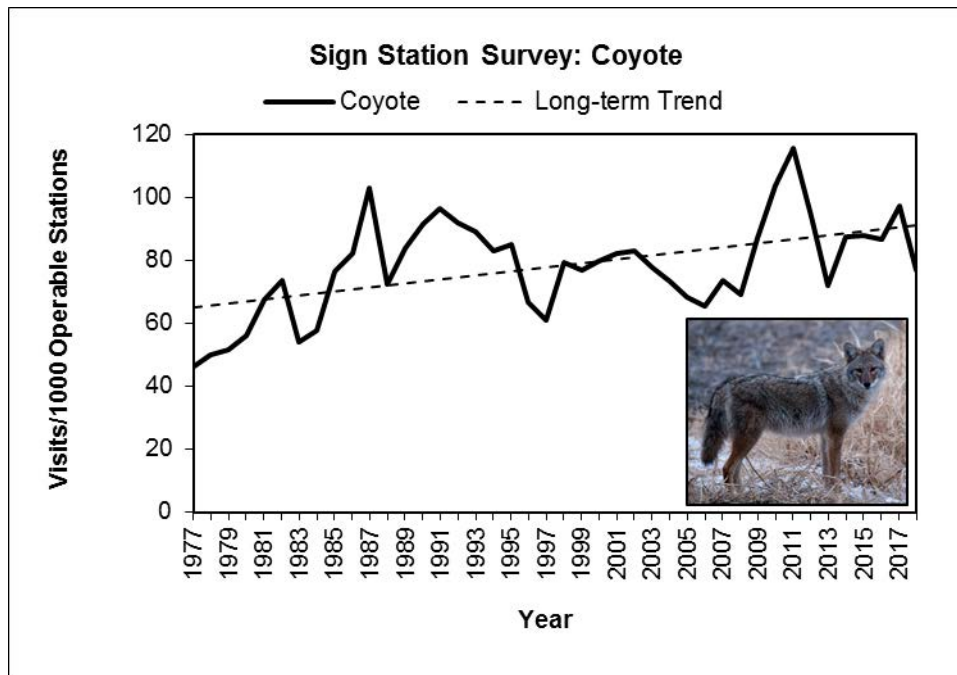


Figure 9. Missouri coyote population trends based on the Furbearer Sign Station Survey Index.

Fox Harvest and Population Trends



Red fox harvest during the 2018-19 season decreased 30.79% from 812 to 562 individuals harvested (Figure 10). **Gray fox harvest** also decreased in 2018-19 by 44.24% to 242 individuals compared with last year's harvest of 434 (Figure 11). Fox harvest is typically a by-product of bobcat or coyote trapper effort. Bobcat harvest decreased in the 2018-19 season and, as a result, a decrease in by-catch of foxes was likely observed.

Population trends are derived from the Bowhunter Observation Survey and Furbearer Sign Station Survey. For a detailed description of these surveys, see Section II of this report. Bowhunter observations and sign station surveys offer a long-term perspective suggesting declines in both red and gray fox populations (Figures 12 and 13). Long-term fox population declines may be the result of interspecific competition with coyotes and bobcats. Another possible strain on gray fox populations is the increasing population of raccoons and the associated distemper virus, for which gray fox may be particularly vulnerable. We continue to observe slight upticks in trend indicators for both red and gray fox around suburban areas where foxes may be seeking refuge from coyotes, but the overall trend is still in decline.



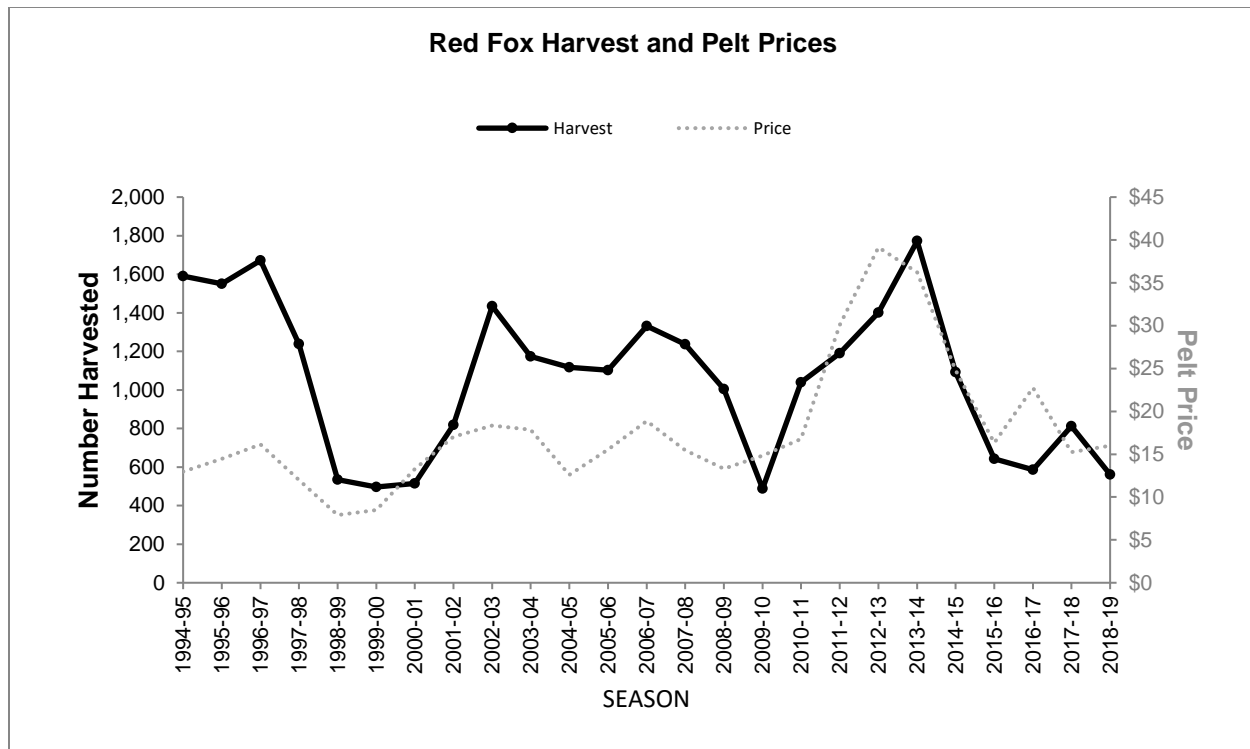


Figure 10. Comparison of Missouri red fox harvest and pelt prices over the last 25 years. Harvest estimates are derived from fur buyer records. Annual pelt price estimates are the average price from the Missouri Trappers Association Fur Auction.

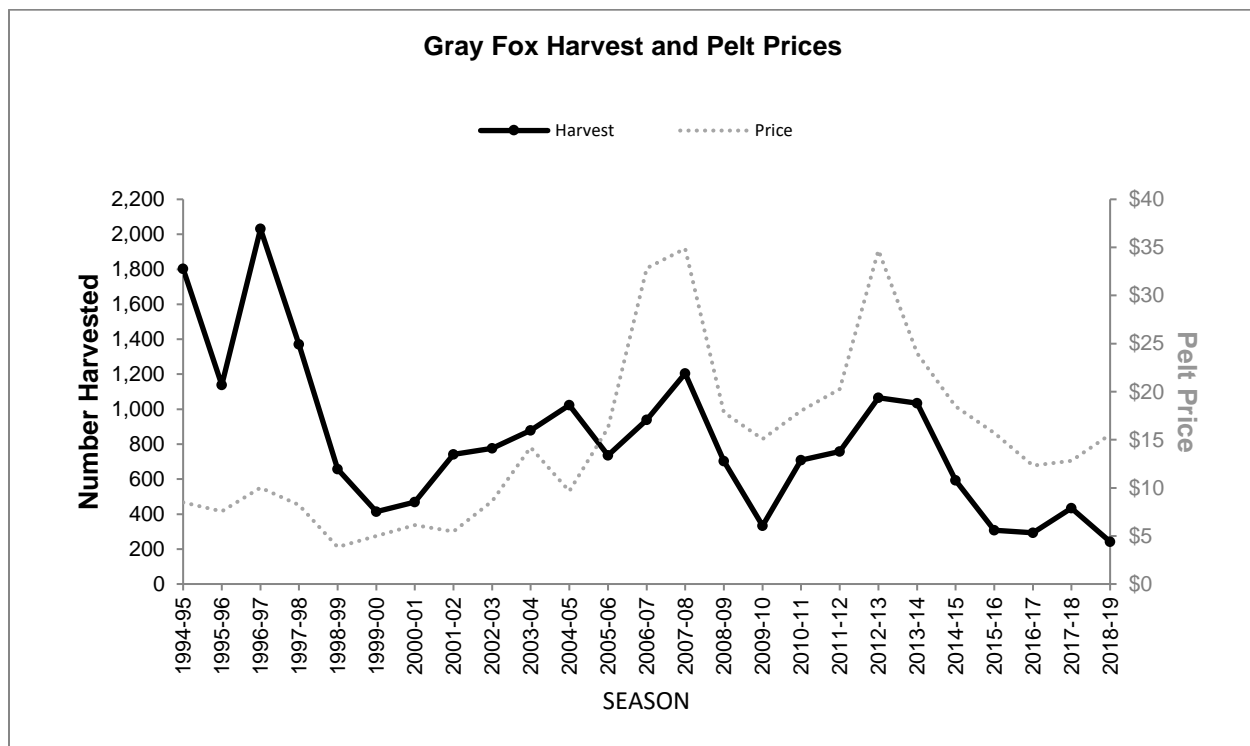


Figure 11. Comparison of Missouri gray fox harvest and pelt prices over the last 25 years. Harvest estimates are derived from fur buyer records. Annual pelt price estimates are the average price from the Missouri Trappers Association Fur Auction.

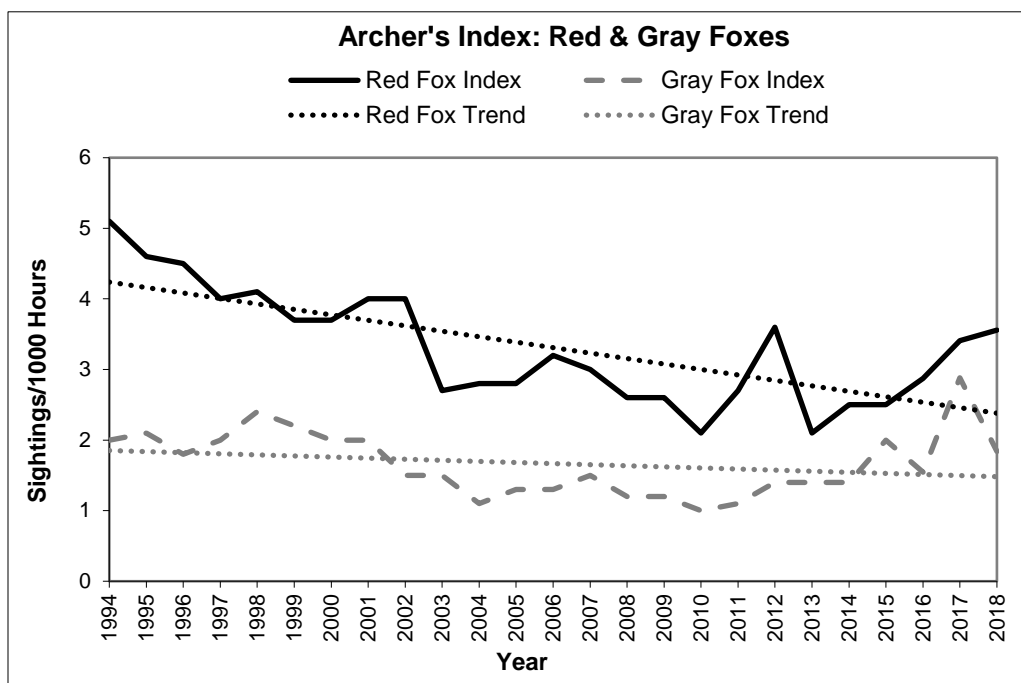


Figure 12. Missouri fox population trends based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

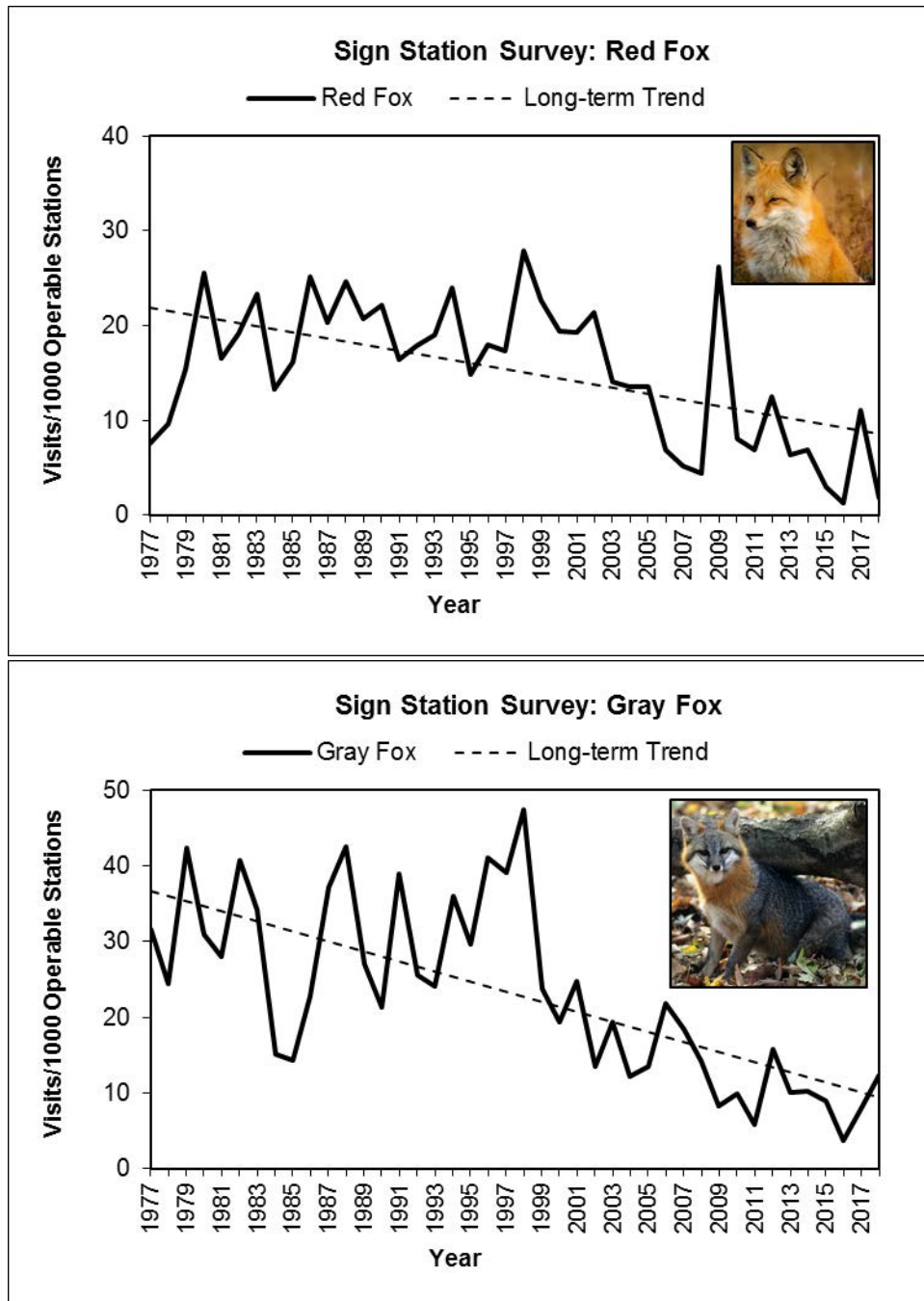


Figure 13. Missouri red and gray fox population trends based on the Furbearer Sign Station Survey Index.

Striped Skunk Harvest and Population Trends

Striped skunk harvest in 2018-19 totaled 156 and with most individuals harvested by trapping (Figure 14). This year's harvest was down 20.81% from last year's harvest of 197 individuals. Harvest is down 55.93% from two years ago, following declines in pelt prices since 2016-17. Average striped skunk pelt prices for 2018-19 decreased 51.80% from 2017-18 from \$3.11 to \$1.50. The 2018-19 season also resulted in the lowest Striped Skunk harvest since 2000-01.



Population trends are derived from the Bowhunter Observation Survey and Furbearer Sign Station Survey. For a detailed description of these surveys, see Section II of this report. Population trend data from the Archer's Index (Figure 15) and sign station survey (Figure 16) for striped skunk suggest populations are stable.

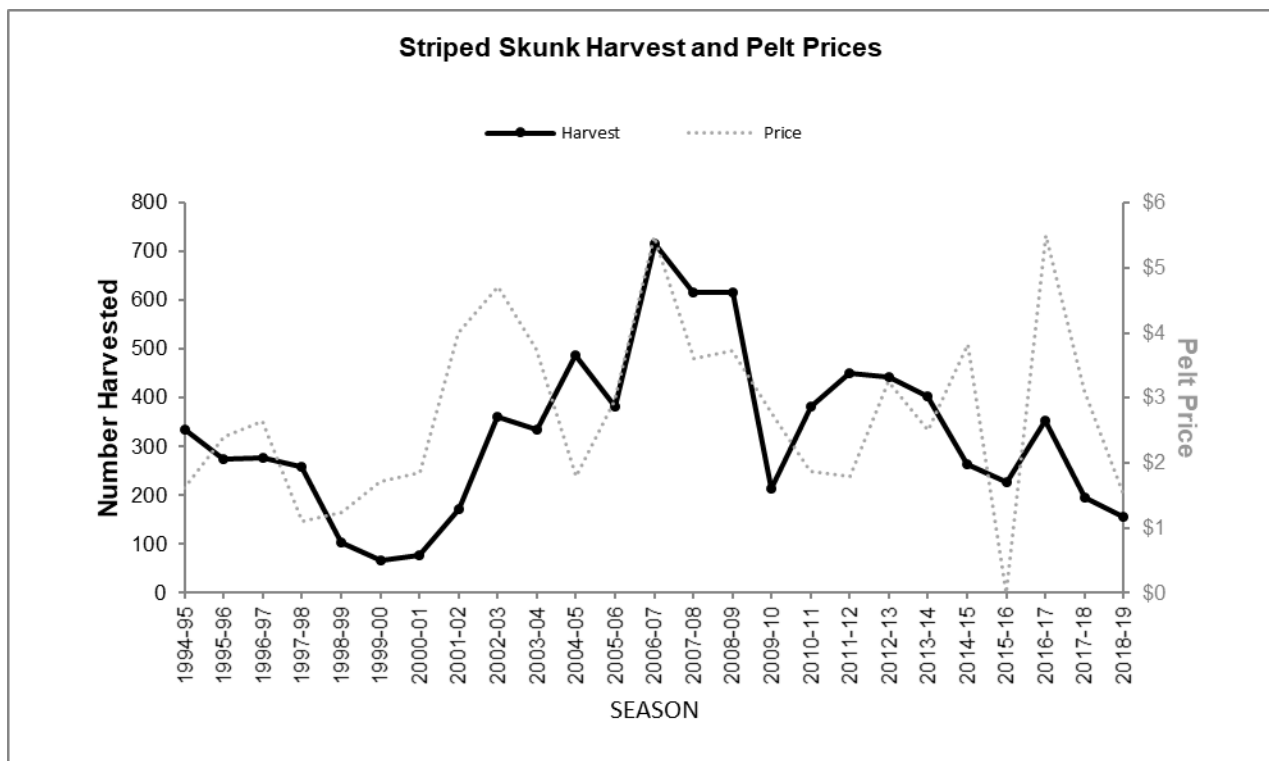


Figure 14. Comparison of Missouri striped skunk harvest and pelt prices over the last 25 years. Harvest estimates are derived from fur buyer records. Annual pelt price estimates are the average price from the Missouri Trappers Association Fur Auction.

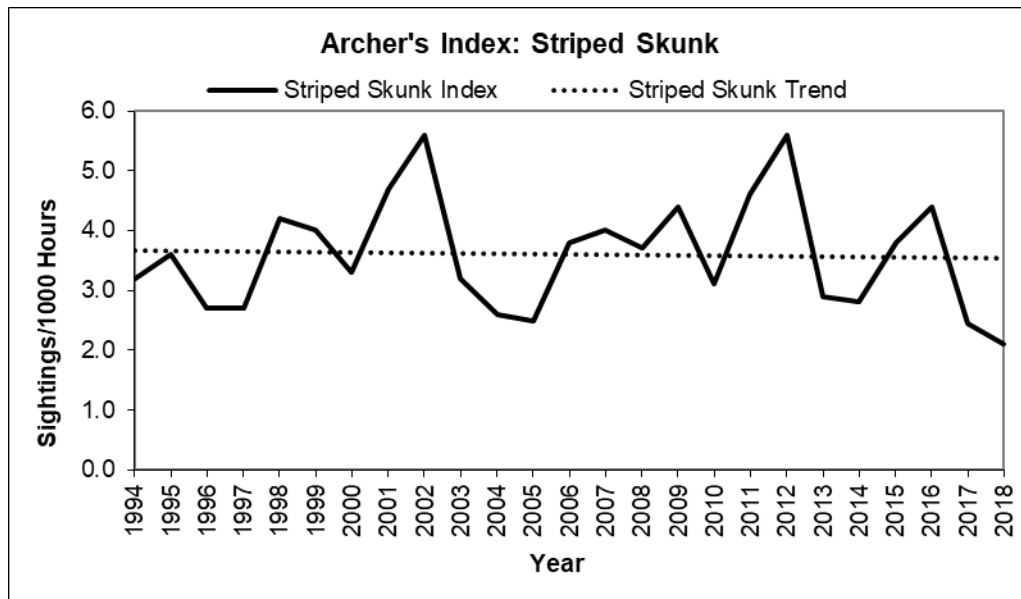


Figure 15. Striped skunk population trends based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

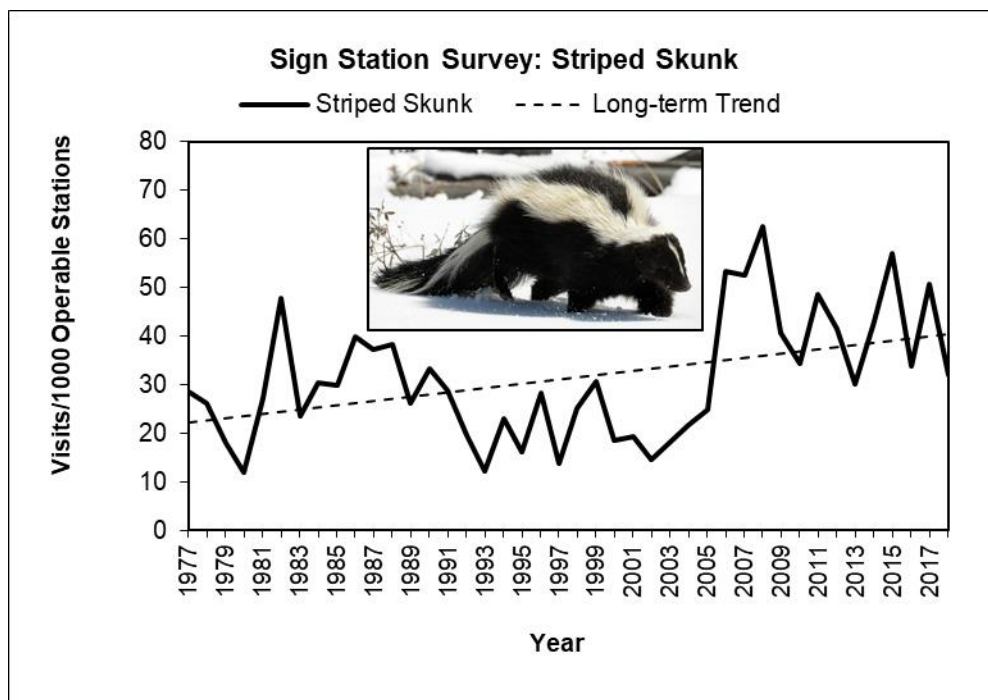


Figure 16. Missouri striped skunk population trends based on the Furbearer Sign Station Survey Index.

Bobcat Harvest and Population Trends

Bobcat harvest during the 2018-19 season was down 28.40% from 2017-18 and up 2.71% from 2016-17 harvest seasons (Figure 17) with **2,161 bobcats** harvested. Prices during the 2018-19 season increased by 61.16% from the previous year. Trappers and hunters are required to check or register bobcat carcasses or green pelts at MDC offices or with Conservation Agents. The number of bobcat pelts purchased by fur dealers (916) was significantly less than those registered by trappers and hunters as required by CITES (2,161). Instead of selling to fur buyers, trappers may make more money selling carcasses to taxidermists or selling mounted bobcats. The decline in harvest and in the number of bobcat pelts purchased by fur dealers also is likely attributed to a poor global fur market.

Population trends are derived from the Bowhunter Observation Survey and Furbearer Sign Station Survey. For a detailed description of these surveys, see Section II of this report. Both Sign Station Survey and Archer's Index data suggest bobcat populations may have decreased slightly this year; however, the overall trend appears to be stable (Figures 18 and 19).

Geographic distribution of harvest varies by county and method. Trappers harvested 1,329 bobcats, while hunters harvested 754 bobcats. Reynolds County had the highest total harvest (Figure 20) and trapping harvest (Figure 21), while Perry County had the highest hunter harvest (Figure 22).

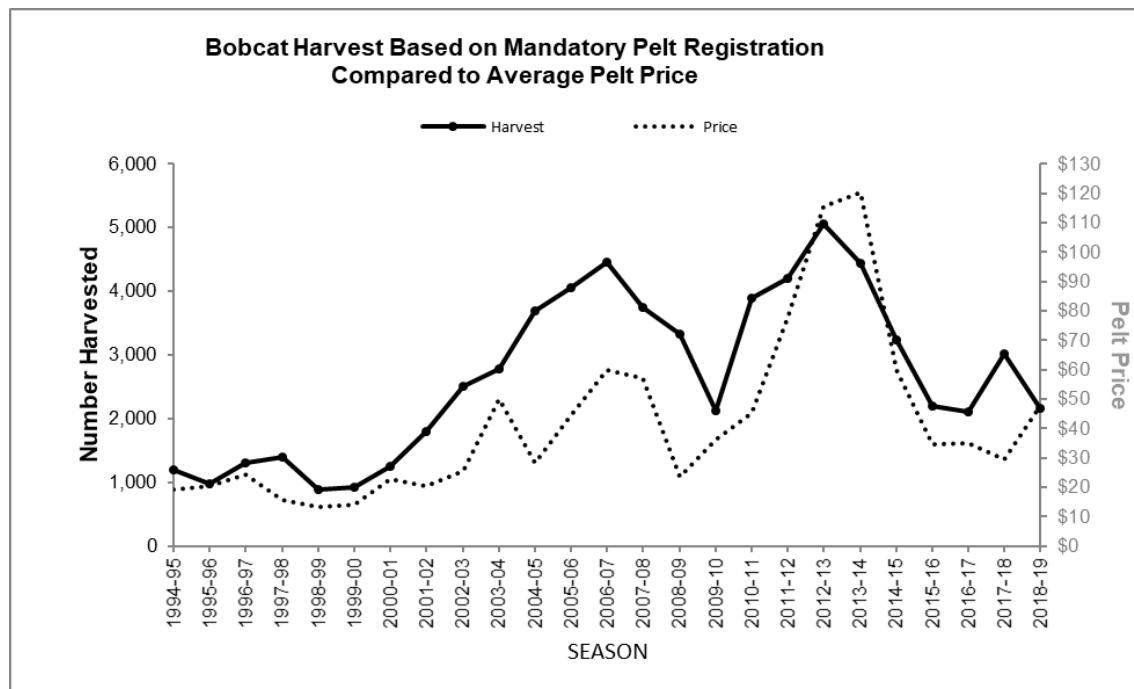


Figure 17. Missouri bobcat harvest trends over the last 25 years compared to average pelt prices.

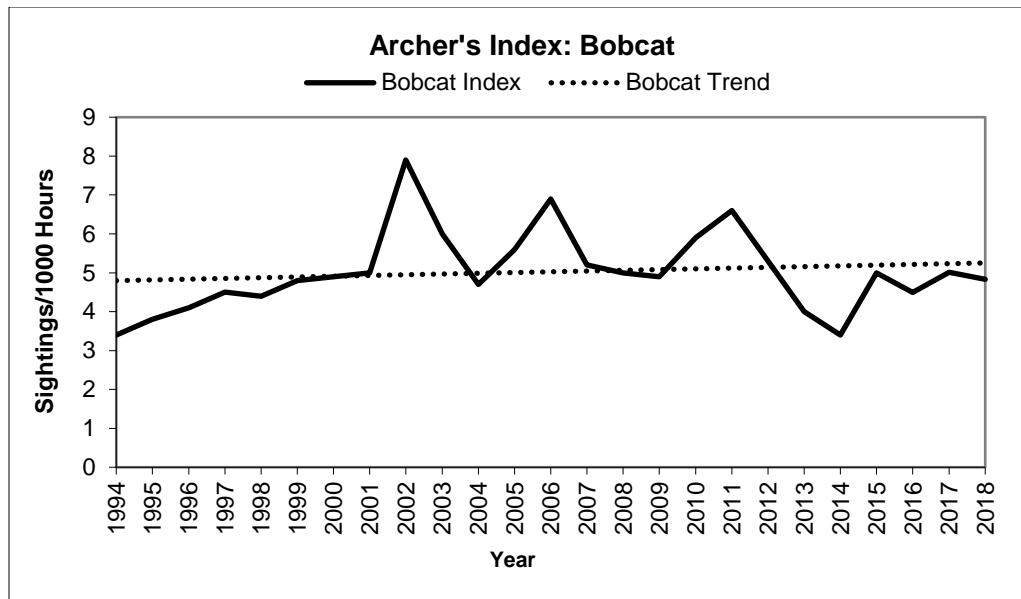


Figure 18. Missouri bobcat population trends based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

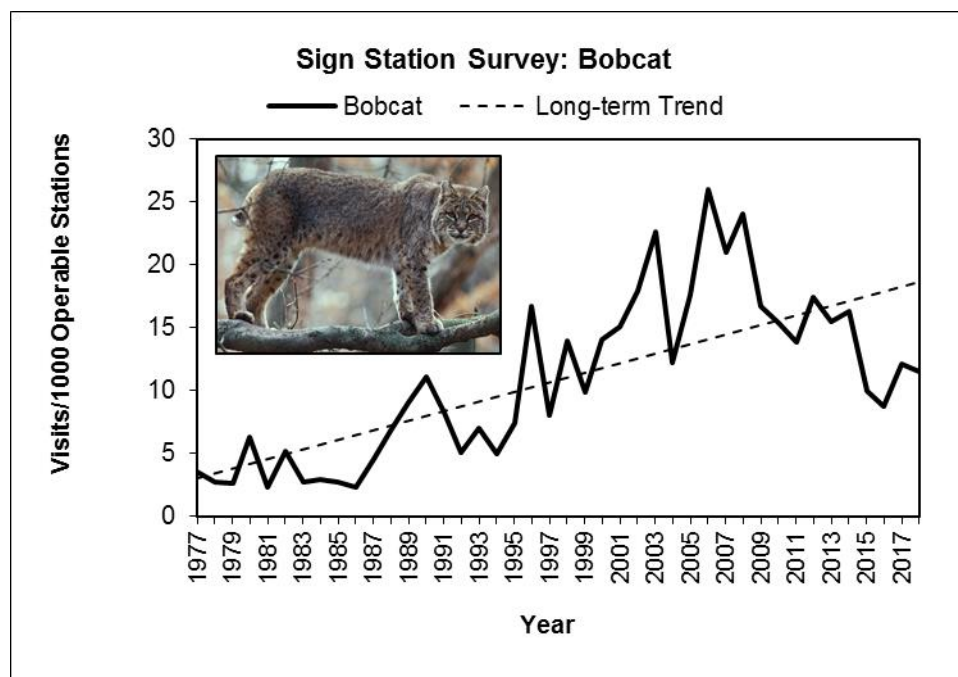


Figure 19. Missouri bobcat population trends based on the Furbearer Sign Station Survey Index.

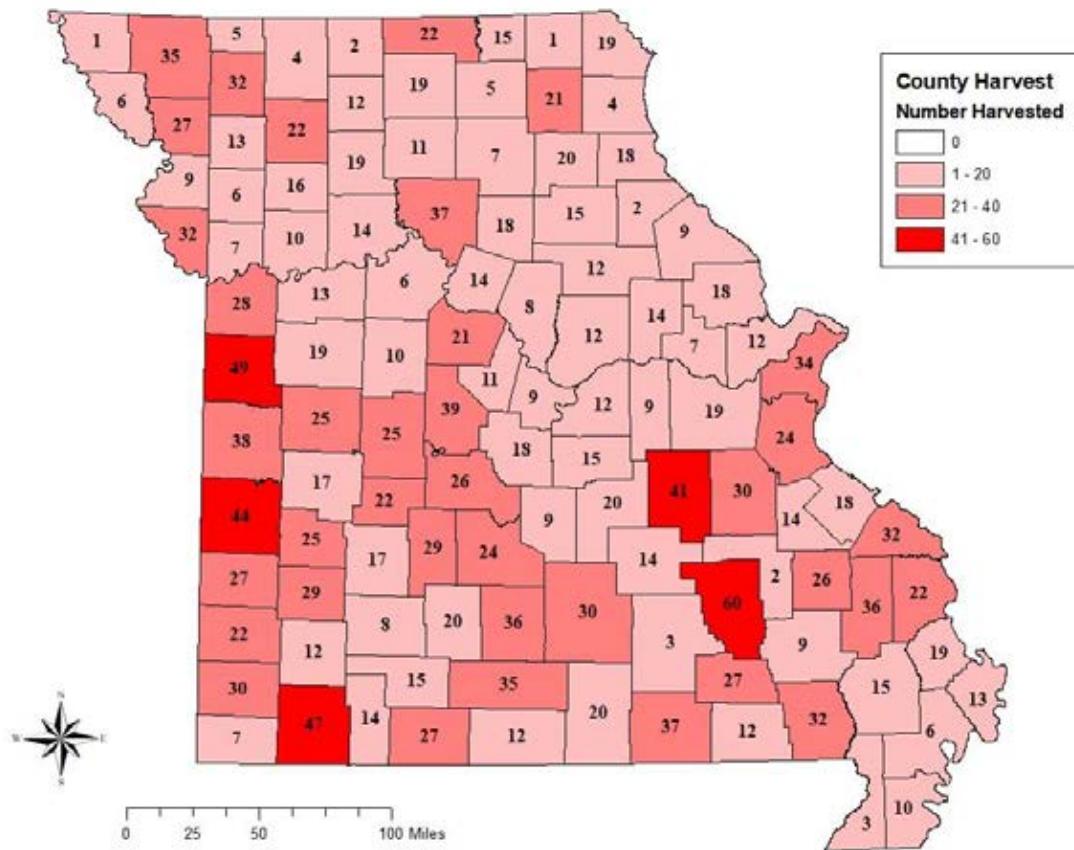


Figure 20. Number of Missouri bobcats harvested per county during the 2018-19 season.

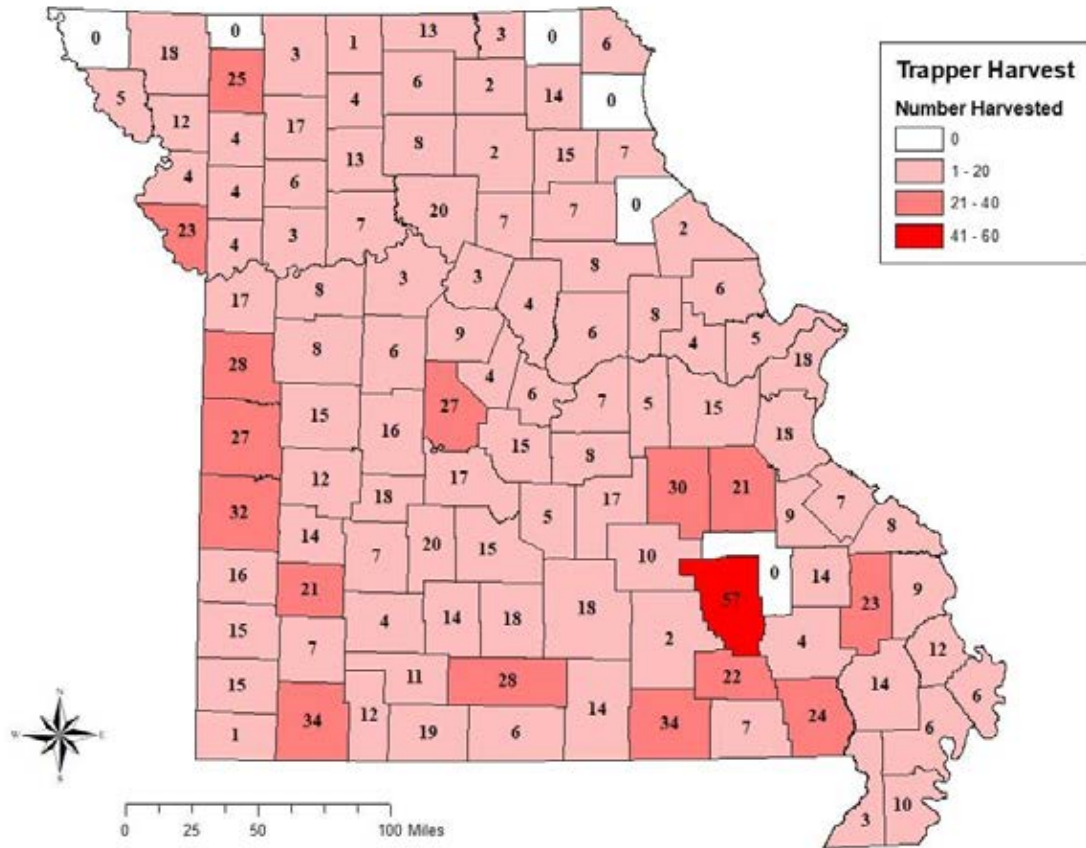


Figure 21. Number of Missouri bobcats harvested by trapping methods per county in the 2018-19 season.

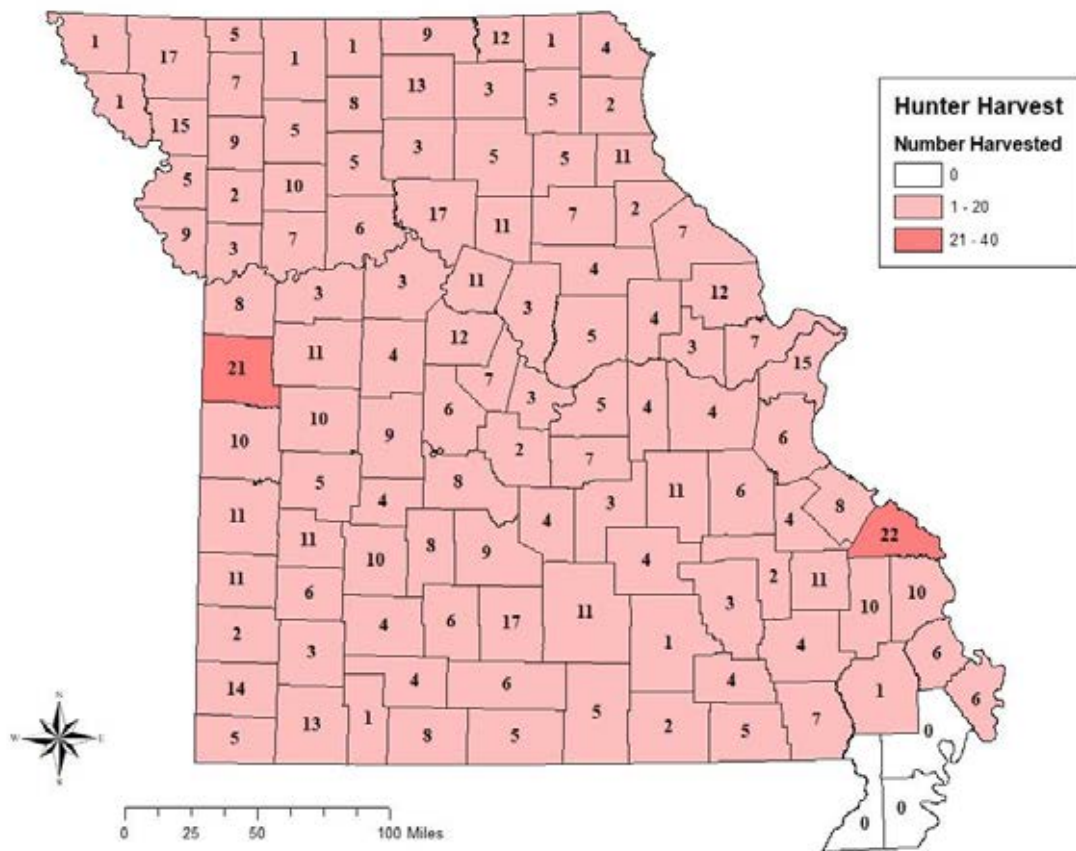


Figure 22. Number of Missouri bobcats harvested by hunting methods per county in the 2018-19 season.

River Otter Harvest

River otter harvest for the 2018-19 furbearer season was **1,412 river otters**, down 30.27% from last year and 0.64% from the 2015-16 season. River otter pelt prices increased 27.45% from last year but were 35.5% lower than the 10-year average. The relatively low harvest of the last five seasons can be attributed to the steady decline in pelt prices (Figure 23).



Trappers are required to check or register river otter carcasses or green hides at MDC offices or with Conservation Agents in accordance with requirements by CITES for exportation outside of the United States. Trappers took an average of 3.5 river otters per harvest season.

River otter harvest was highest in Chariton County with more than 83 individuals harvested (Figure 24). Harvest in Chariton County also was among the highest harvest counties in the last three seasons. Opportunity to harvest river otter from impoundments (i.e., ponds and lakes) and rivers or streams is abundant in Missouri with 935 river otters harvested from streams, rivers, and other water bodies like bayous, sloughs, ditches, and chutes (Figure 25) and 406 river otters harvested from ponds or lakes (Figure 26). River otter harvest during the 2018-2019 season was highest in the West Osage River and Missouri River watersheds (Figure 27). Approximately 14.31% of the total harvest was taken from these two watersheds (Table 4). River otters harvested from an undeclared watershed were combined into one category of unknown (Table 4) and comprised 23.79% of the total harvest.



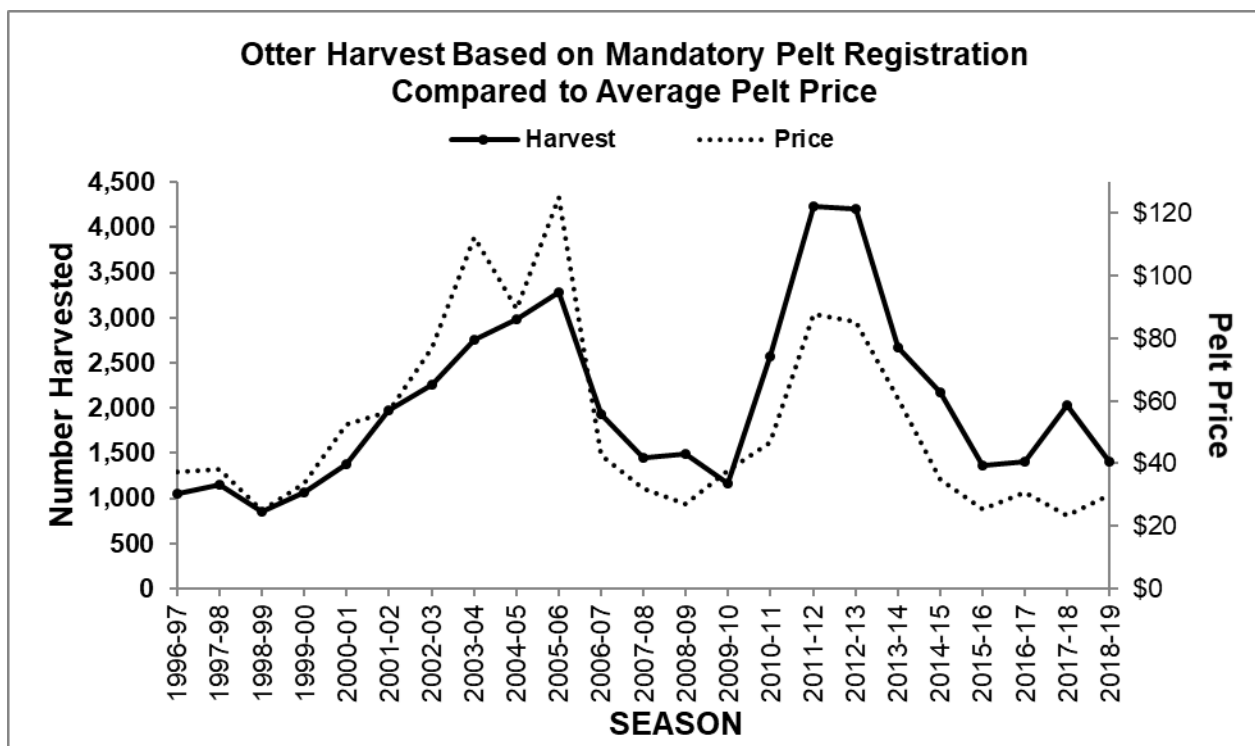


Figure 23. Missouri river otter harvest and average pelt prices from 1996 to 2018.

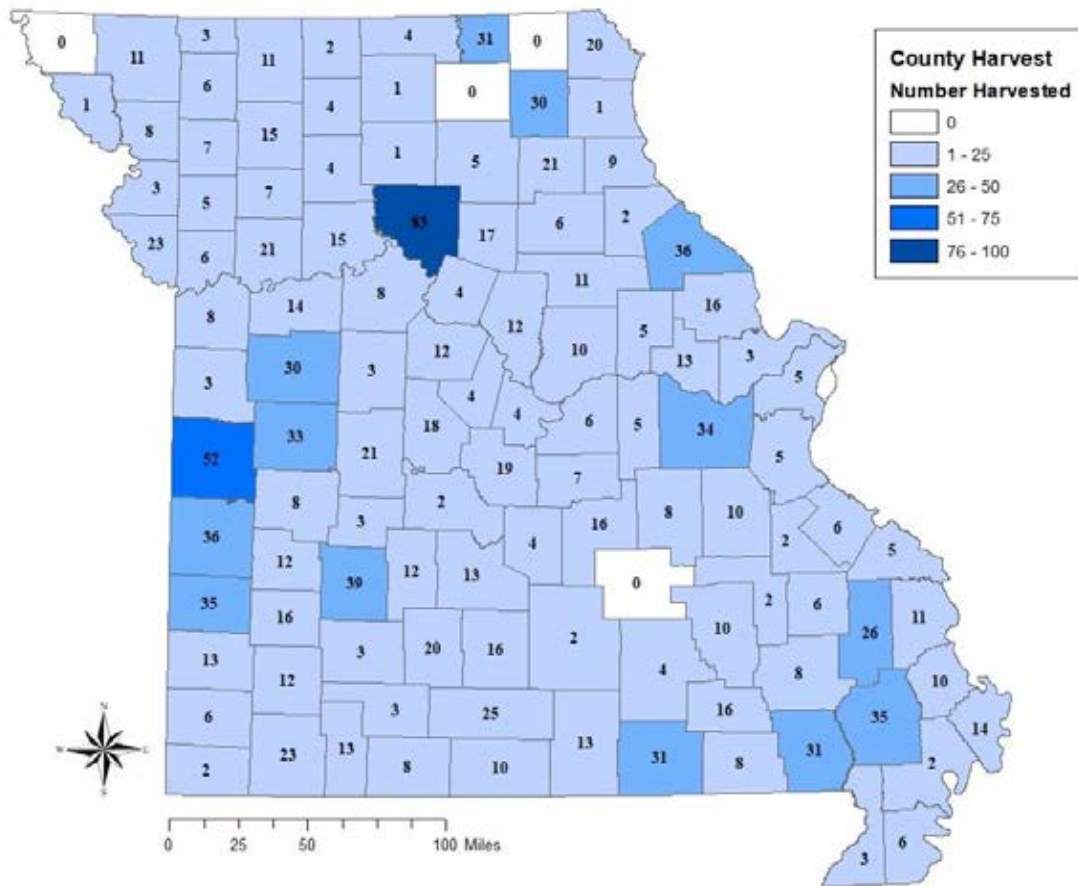


Figure 24. Number of Missouri river otters harvested in each county during the 2018-19 season.

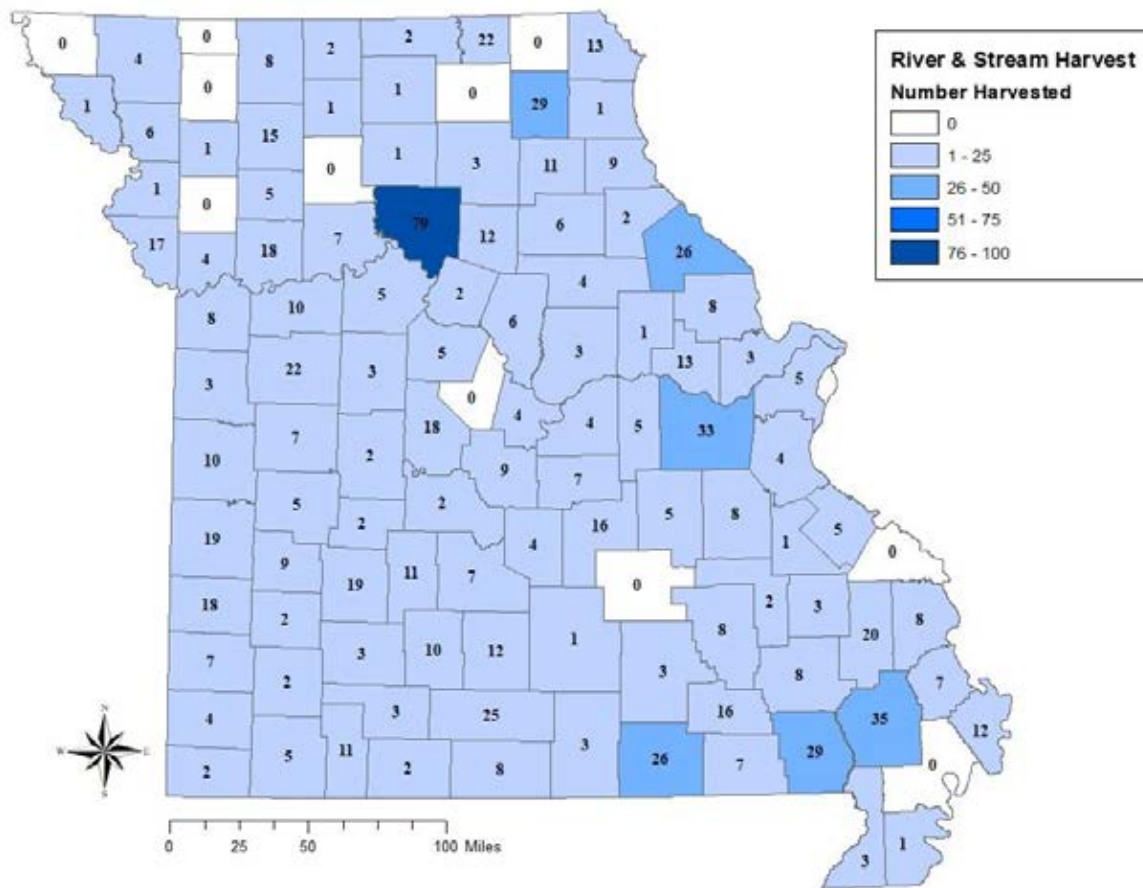


Figure 25. Number of Missouri river otters harvested from rivers, streams, and other water bodies such as sloughs, ditches, chutes, and bayous per county during the 2018-19 season.



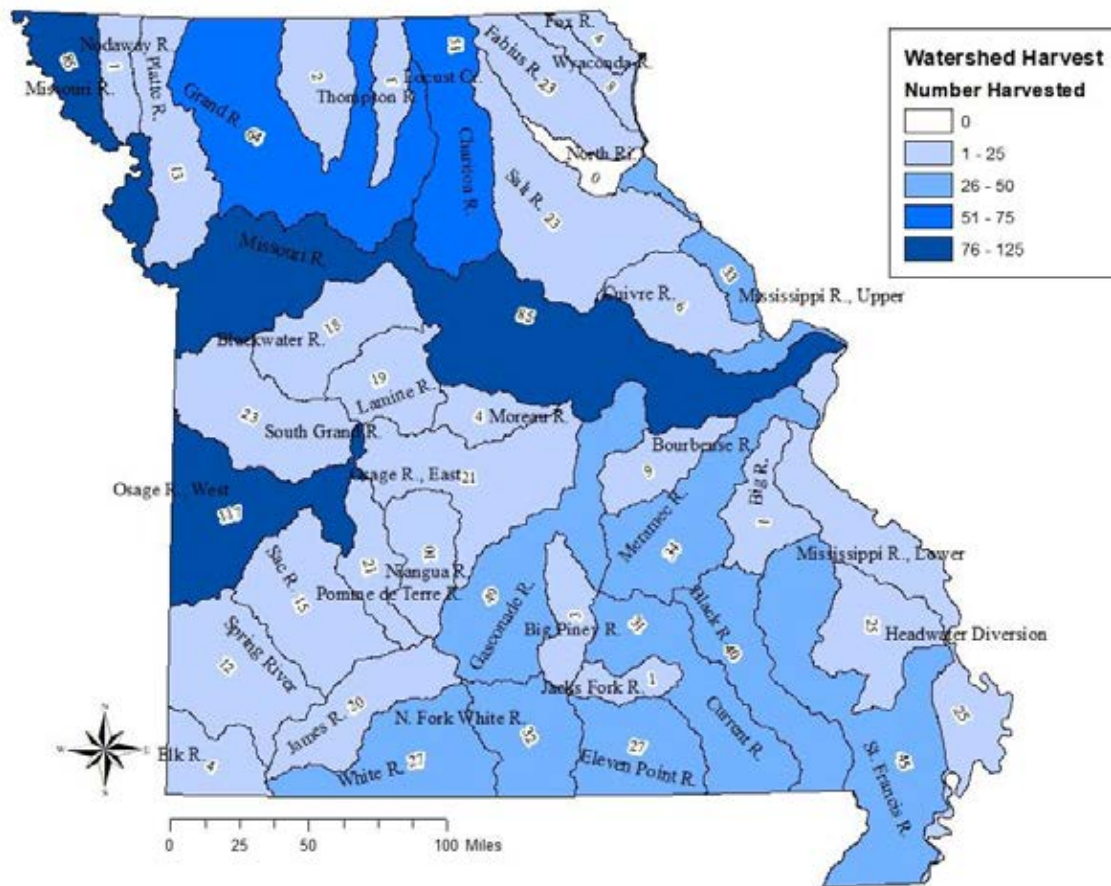


Figure 27. Missouri river otter harvest distribution among watersheds during the 2018-19 trapping season.

Table 4. Missouri river otter harvest distribution among watersheds during the 2018-19 trapping season.

Watershed	Number Harvested	Percent of Harvest	Watershed	Number Harvested	Percent of Harvest
Big Piney River	3	0.21%	Mississippi River (upper)	33	2.34%
Big River	1	0.07%	Missouri River	85	6.02%
Black River	40	2.83%	Moreau River	4	0.28%
Blackwater River	18	1.27%	N. Fork White River	32	2.27%
Bourbeuse River	9	0.64%	Niangua River	10	0.71%
Chariton River	51	3.61%	Nodaway River	1	0.07%
Cuivre River	6	0.42%	North River	0	0.00%
Current River	31	2.20%	Osage River East	21	1.49%
Eleven Point River	27	1.91%	Osage River West	117	8.29%
Elk River	4	0.28%	Platte River	13	0.92%
Fabius River	23	1.63%	Pomme de Terre River	21	1.49%
Fox River	4	0.28%	S. Grand River	23	1.63%
Gasconade River	49	3.47%	Sac River	15	1.06%
Grand River	64	4.53%	Salt River	23	1.63%
Headwater Diversion	25	1.77%	Spring River	12	0.85%
Jacks Fork River	1	0.07%	St. Francis River	45	3.19%
James River	20	1.42%	Thompson River	2	0.14%
Lamine River	19	1.35%	White River	27	1.91%
Locust Creek	3	0.21%	Wyaconda River	8	0.57%
Meramec River	34	2.41%	Unknown	463	32.79%
Mississippi River (lower)	25	1.77%	Total Harvest	1,412	100%

Mink, Muskrat, and Beaver Harvest and Population Trends

Mink, muskrat, and beaver harvests continue to fluctuate in somewhat predictable ranges. Since 1990, mink harvests have varied from about 150 – 1,500 (Figure 28), muskrat harvests from 5,000 – 20,000 (Figure 29), and beaver harvests from 2,000 – 10,000 (Figure 30). Historically, mink and muskrat numbers have fluctuated widely; however, habitat degradation has limited populations and subsequently reduced harvest. Beavers are a longer-lived species and less vulnerable to depredation; harvest rates are more likely related to pelt values. Trappers harvested 163 mink (Figure 28), 3,344 muskrats (Figure 29), and 2,094 beavers (Figure 30) during the 2018-19 season. Mink prices increased 22.6% despite years of price reductions from an influx of ranched mink on the market (NAFA, 2019; FHA, 2019). Muskrat prices also increased this year by 59% from \$2.95 to \$4.69. Beaver is still an important item for hatters (NAFA, 2019; FHA, 2019), and beaver prices increased by 49.4% from \$6.42 to \$9.59.



Population trends for these species are derived from the Bowhunter Observation Survey. For a detailed description of the survey, see Section II of this report. Population trend data are low (Figure 31), in part, because these animals are associated with water bodies and may not be a common sighting for archers. Given that, trends of mink, muskrat, and beaver suggest populations are stable with slight declines for beaver.

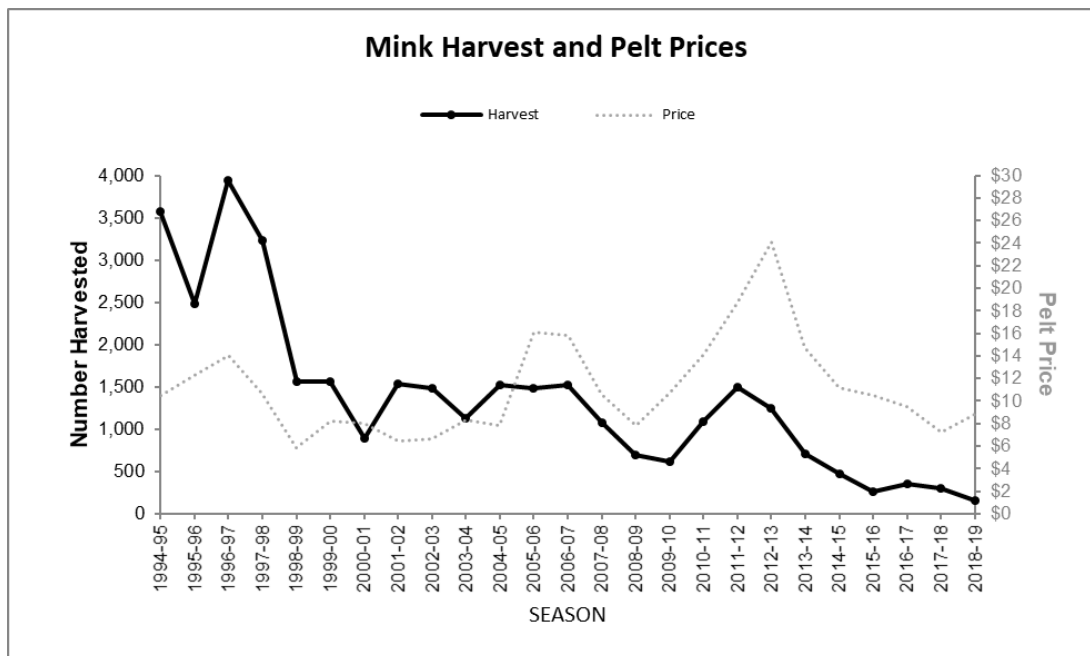


Figure 28. Missouri mink harvest trends over the last 25 years compared to average pelt prices. Harvest estimates are derived from fur buyer records. Annual pelt prices are the average price from the Missouri Trappers Association Fur Auction.

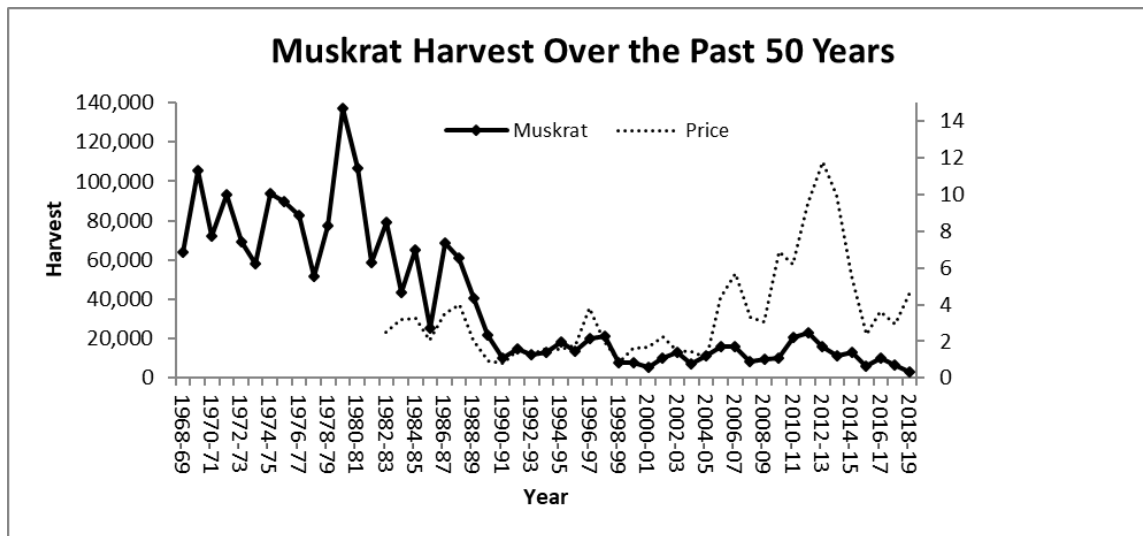


Figure 29. Comparison of Missouri muskrat harvest and pelt prices over the last 50 years. Harvest estimates are derived from fur buyer records. Annual pelt prices are the average price from the Missouri Trappers Association Fur Auction.

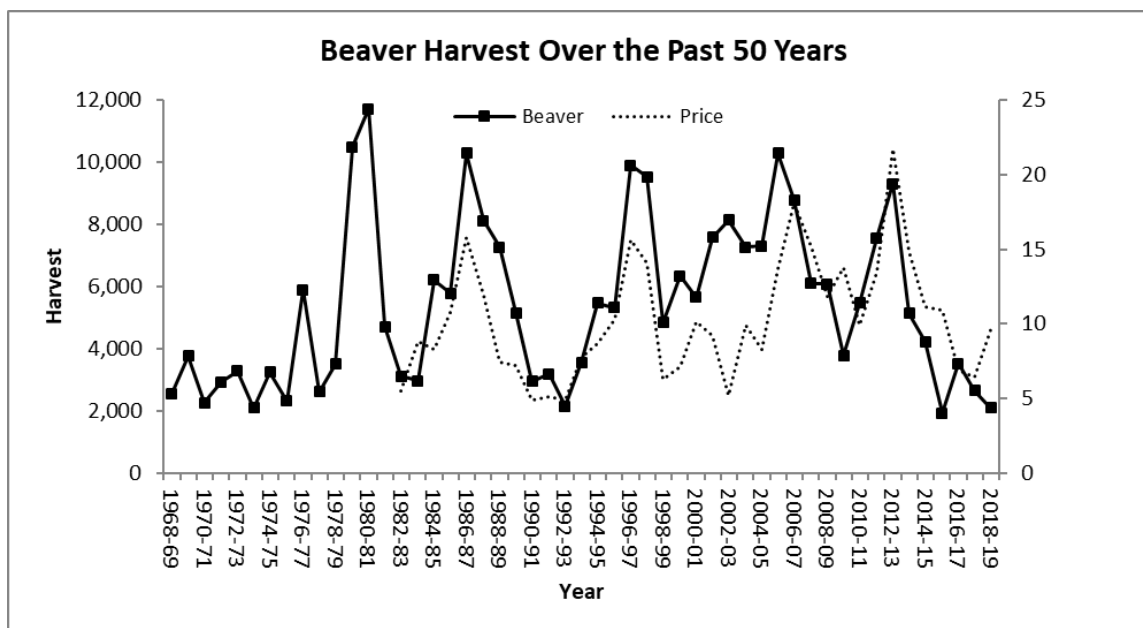


Figure 30. Comparison of Missouri beaver harvest and pelt prices over the last 50 years. Harvest estimates are derived from fur buyer records. Annual pelt prices are the average price from the Missouri Trappers Association Fur Auction.

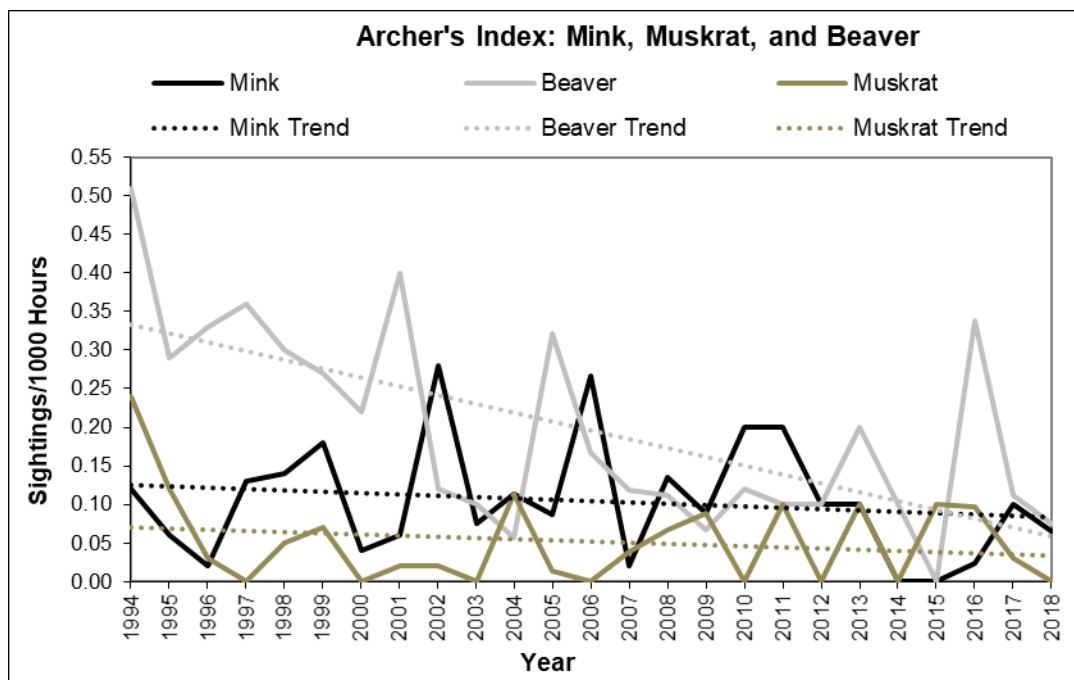


Figure 31. Mink, muskrat, and beaver population trends based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.



American Badger Status in Missouri

The **American badger** is a native, but uncommon, furbearing species in Missouri and is state-ranked as a **Vulnerable Species of Conservation Concern** by MDC. American badgers are a fossorial (burrowing animal) species and require habitat where suitable soil is available for digging burrows for both themselves and for hunting prey. American badgers can be found throughout the state in any of the **8 zoological regions** (Figure 32), but soil most suitable for burrowing mammals occurs primarily in four regions: Western Prairie, Northwest Prairie, Northern Riverbreaks, and Northeast Riverbreaks. Consequently, the bulk of the recorded observations in the Missouri Natural Heritage database occur in these four regions.

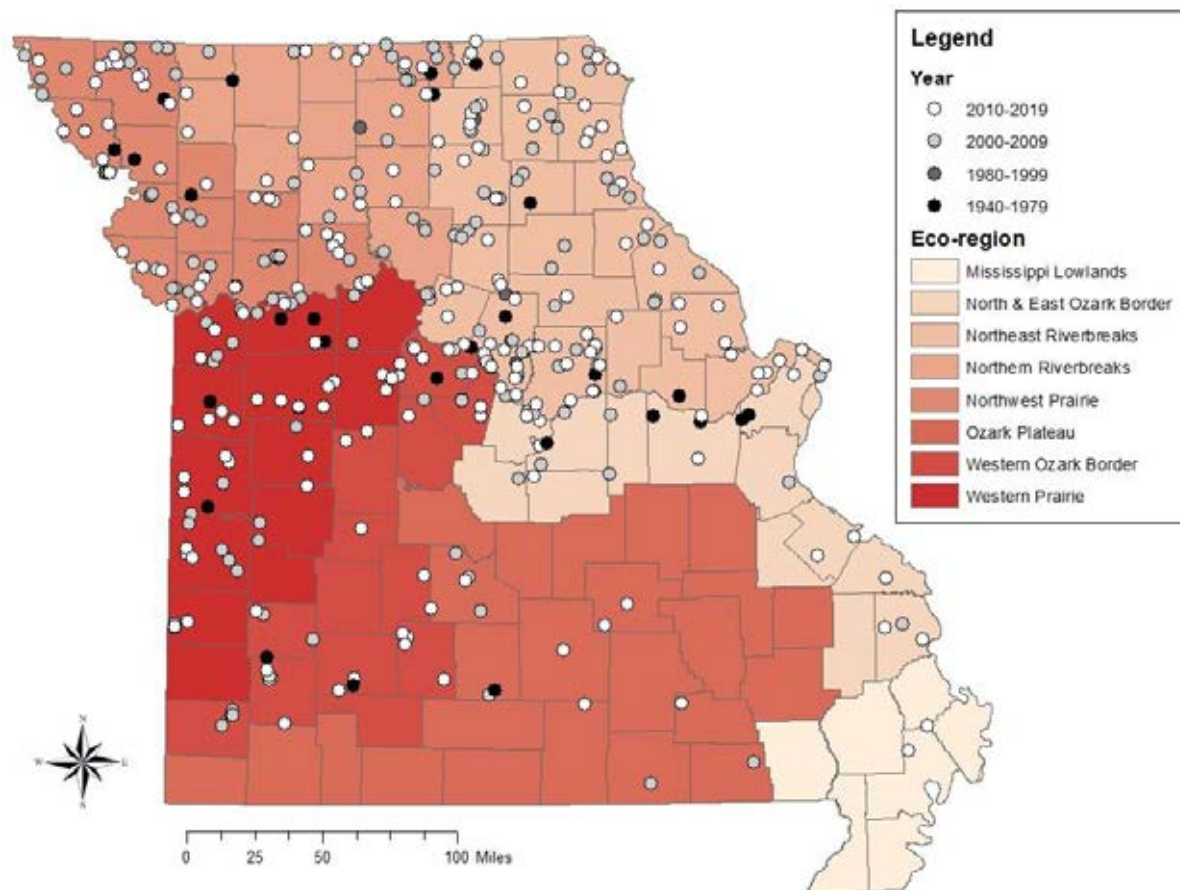


Figure 32. American badger sightings in the Missouri Natural Heritage database range from the 1940s to present and occur in all 8 zoological regions. This includes the 33 additional records from July 1, 2018, to June 30, 2019.

Considered a furbearing species in the state of Missouri, American badgers are harvested annually during the trapping season. However, harvest has historically been low compared to other furbearers because American badger pelts are not as desirable and typically sell for lower prices than other, more valuable pelts

(Figure 33). Furthermore, most American badger harvest occurs as a result of nuisance animal removal. In recent decades, harvest has declined and likely is a result of several factors. First, grasslands and prairies, where the soil substrate is suitable for burrowing, are primary habitat types for American badgers. As these habitats are converted to intensive agriculture, available habitat for American badgers decreases, mostly due to the loss of prey species in these areas. Second, interest in trapping also has declined and fewer individuals participate in trapping.

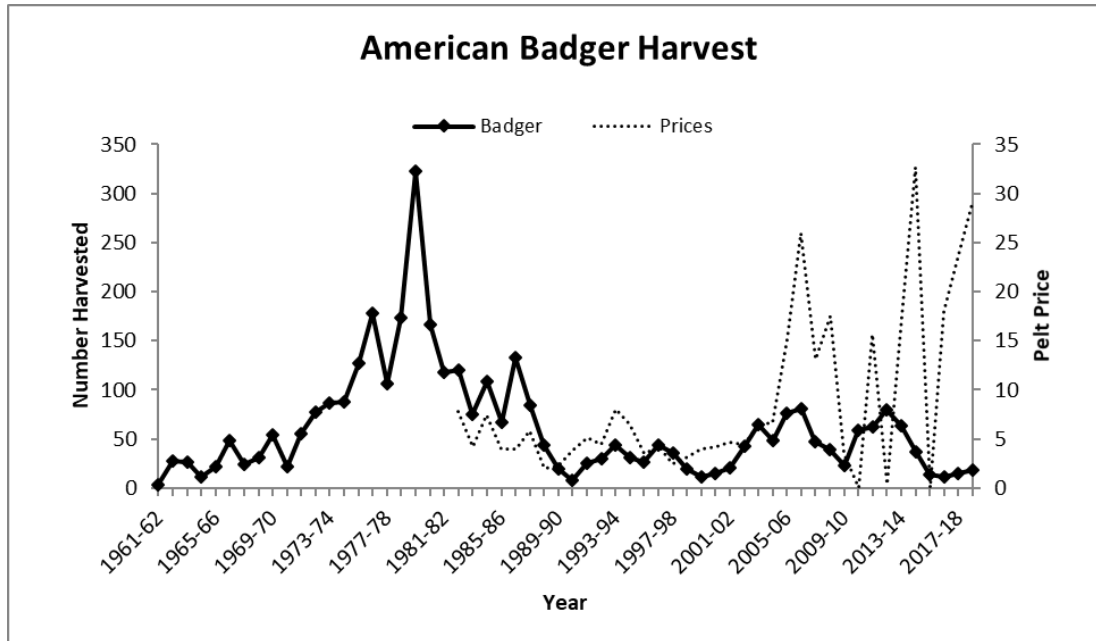


Figure 33. American badger harvest (1961 to present) and pelt prices (1983 to present) in Missouri.

To offset the reduced number of observations and low harvest, MDC made a concerted effort to collect and record American badger observations and specimens from citizens (e.g., trappers) and MDC personnel from 2009 through 2011 to better understand the demographics and distribution of American badgers in Missouri. As a result, more than 300 records occur within the Missouri Natural Heritage database allowing the Department to determine where the species is most prevalent in the state. Since 2011, observations and specimens have been collected opportunistically and MDC will continue to collect information about American badgers from citizens and MDC personnel. Beginning in November 2017, MDC once again made a call for American badger observations with the distribution of a flyer to MTA, MDC Regional Offices, and State Parks (Figure 34). This renewed effort produced 24 new reports of American badgers across the state, but primarily in the four suitable zoological regions mentioned previously (Figure 32).





WANTED: Rare Furbearer Sightings



American Badger	Spotted Skunk	Least Weasel	Long-tailed Weasel
			
<p>Flattened body with short, stocky legs. Face is distinctive with black patches, whitish chin and throat, and a prominent white stripe down the head. Weigh 8 to 20 pounds.</p>	<p>Distinct white spot in the center of the forehead and in front of each ear. Broken stripes down the body give a "spotted appearance." Weigh 0.5 to 2 pounds.</p>	<p>Long, tubular shape with a tail that is 25% of the head-body length. May turn white in the winter, in summer have brown pelts with white feet and underside. Found in northern Missouri and weigh 1 to 3.5 ounces.</p>	<p>Tail is 50% or more of the head-body length. May turn white in the winter, but have brown pelts in the summer with cream-yellow undersides. Found statewide and weigh 3 to 16 ounces.</p>

If you have seen any of these species in Missouri, the Department of Conservation would like your help!

Badger can be legally harvested in Missouri during the established season. Please report any badger sightings, captures or road-kill animals. If you are willing to turn-in a badger carcass, please contact Laura Conlee at the number below.

There is **NO** trapping or hunting season for weasels or spotted skunks. Please report any sightings, photos, or road-kill animals to the Department. If you accidentally trap a weasel or spotted skunk and the animal is alive, it must be immediately released. Please report the incidental capture. If you accidentally trap a weasel or spotted skunk and the animal is dead, the entire carcass must be turned over to your local conservation agent.

<p>MDC needs the following information with report submissions:</p> <ul style="list-style-type: none"> ◆ Date and Time of observation ◆ Number of individuals observed and number of young in group ◆ Location (County, GPS, distance/direction to nearest town, roads, mile markers, etc.) ◆ Sex, if known ◆ Status (alive, trapped, road-killed, etc.) ◆ Name, address, phone number, and/or email 	<p>Report Sightings to:</p> <p><i>Laura Conlee, Furbearer Biologist Missouri Department of Conservation Central Regional Office 3500 East Gans Road Columbia, MO 65201 (573) 815-7900 laura.conlee@mdc.mo.gov</i></p>
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Figure 34. Rare furbearer sightings request flier distributed by Missouri Department of Conservation in 2017.

Rare Furbearers of Missouri



Missouri residents are fortunate to reside in a state with abundant natural resources, including wildlife, and an exceptional diversity of furbearing species. As a result, opportunities for observing wildlife, hunting, and trapping also are abundant. Three traditional furbearing species, the eastern spotted skunk (subspecies plains spotted skunk), least weasel, and long-tailed weasel, recently (within the last 3 decades) exhibited declines in population trends and harvest. The Missouri Department of Conservation (MDC) decided to close trapping for those species due to this significant decline.

The subspecies of **eastern spotted skunk** native to Missouri is the plains spotted skunk. This species was once abundant, albeit not as abundant as their striped cousins, and harvest of 30,000 or more individuals each year was common in Missouri. Declines in annual harvest began in the late 1940s as total harvest dropped precipitously from a high point of more than 55,000 to less than 10,000 individuals over a period of 7 years. After another 5 years, annual harvest dipped to less than 1,000 individuals until harvest dropped to less than 10 each year and MDC closed the season for spotted skunks in 1991-92 (Figure 35). Currently, the plains spotted skunk is listed as **state Endangered** and state-ranked as a **critically imperiled Species of Conservation Concern** in Missouri. Records of spotted skunk sightings are maintained in the Missouri Natural Heritage database, which tracks locations of all Missouri species of conservation concern (Figure 36).

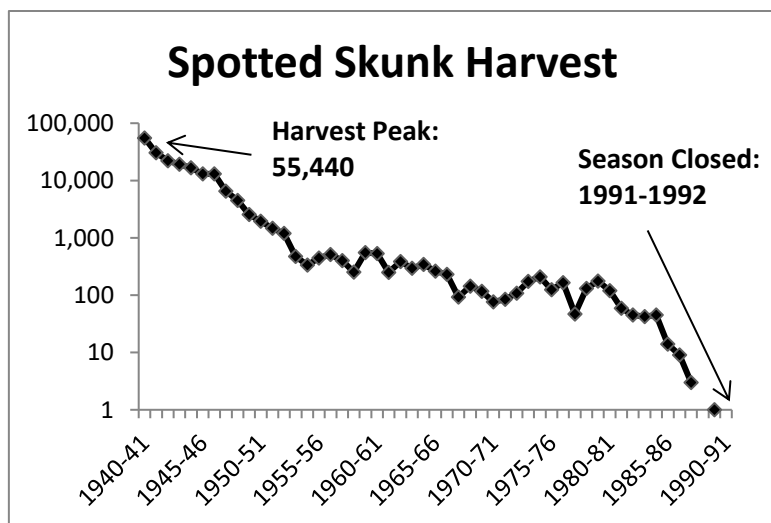


Figure 35. Historic spotted skunk harvest in Missouri from the harvest peak in 1940-41 to the close of the spotted skunk trapping season in 1991-92.

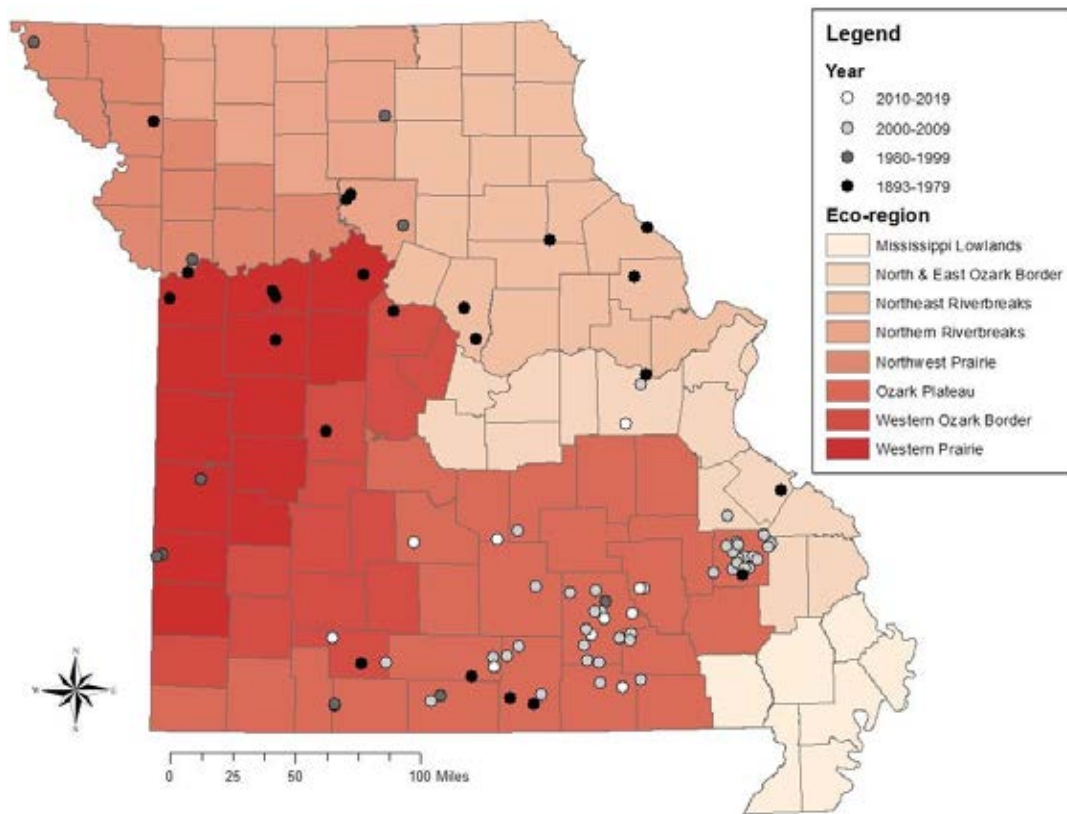


Figure 36. Plains spotted skunk sighting locations from the Missouri Natural Heritage database.

Northern Missouri is the southern extent of the **least weasel's** range; therefore, the species was never widespread in the state. Although traditionally considered a furbearer, Missouri's *Wildlife Code* does not define least weasels as a furbearing or game species. Conversely, **long-tailed weasels** can be found from central Canada into portions of South America and thus, can be found throughout the state of Missouri. Long-tailed weasels are the primary target of weasel trapping efforts in Missouri, but harvest records indicate an overall 'weasel' category suggesting take of both species occurred. Weasels were never a large proportion of the fur harvest in Missouri, but harvest peaked in the mid-1930s before steadily declining until the season was closed in 2000-01 (Figure 37).

Currently, both weasel species are classified as **Species of Conservation Concern** and state-ranked as **Vulnerable**. Like spotted skunks, sightings of both weasel species are maintained in the Missouri Natural Heritage database providing an indication of their distributions in Missouri (Figures 38 and 39).

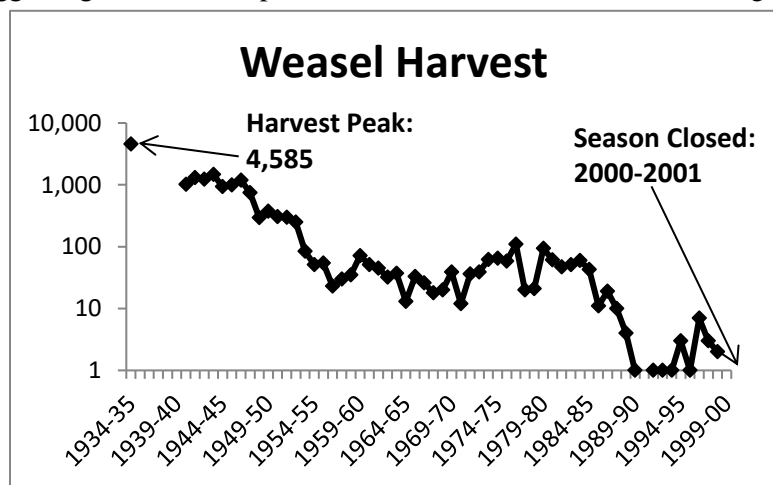


Figure 37. Historic weasel harvest in Missouri from the harvest peak in 1934-35 to the close of the weasel trapping season in 2000-01 with a gap in harvest data from 1935-36 through 1939-40.

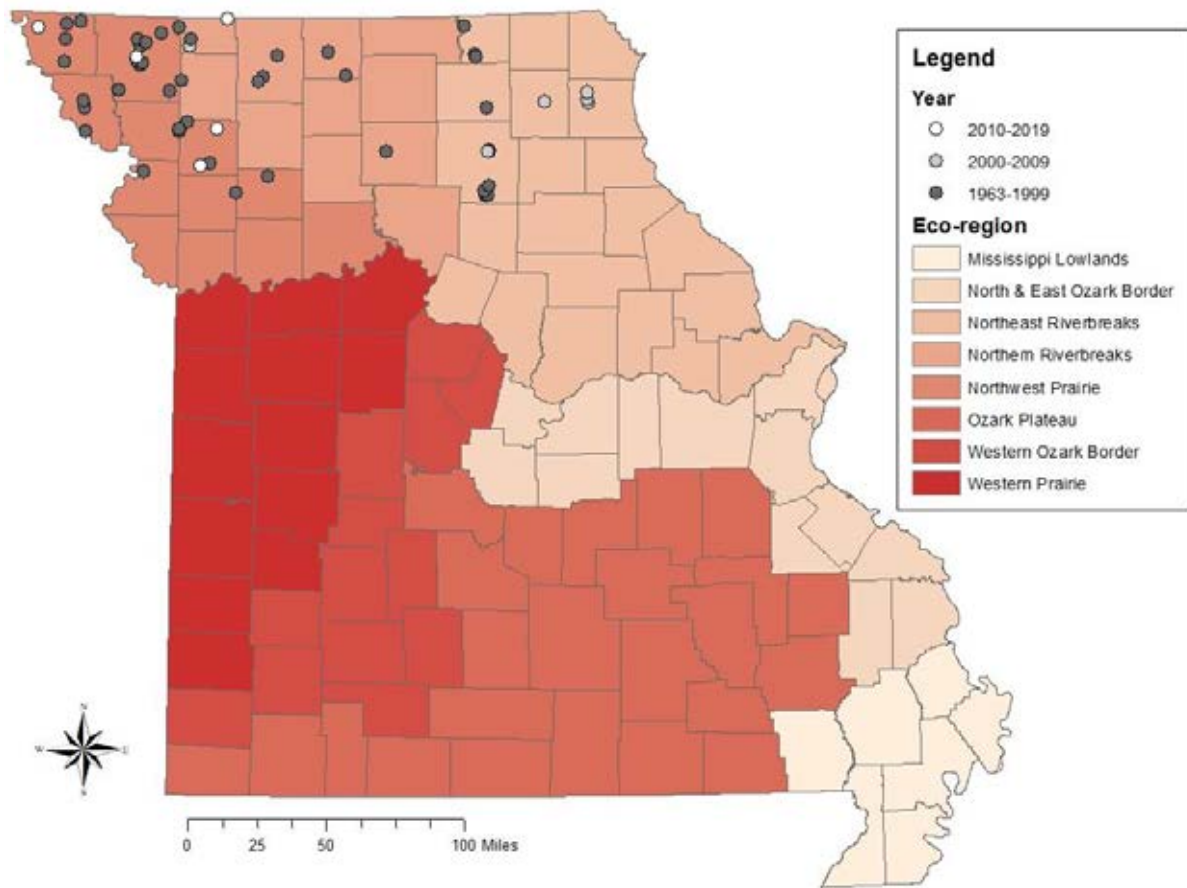


Figure 38. Least weasel sighting locations in the Missouri Natural Heritage database.



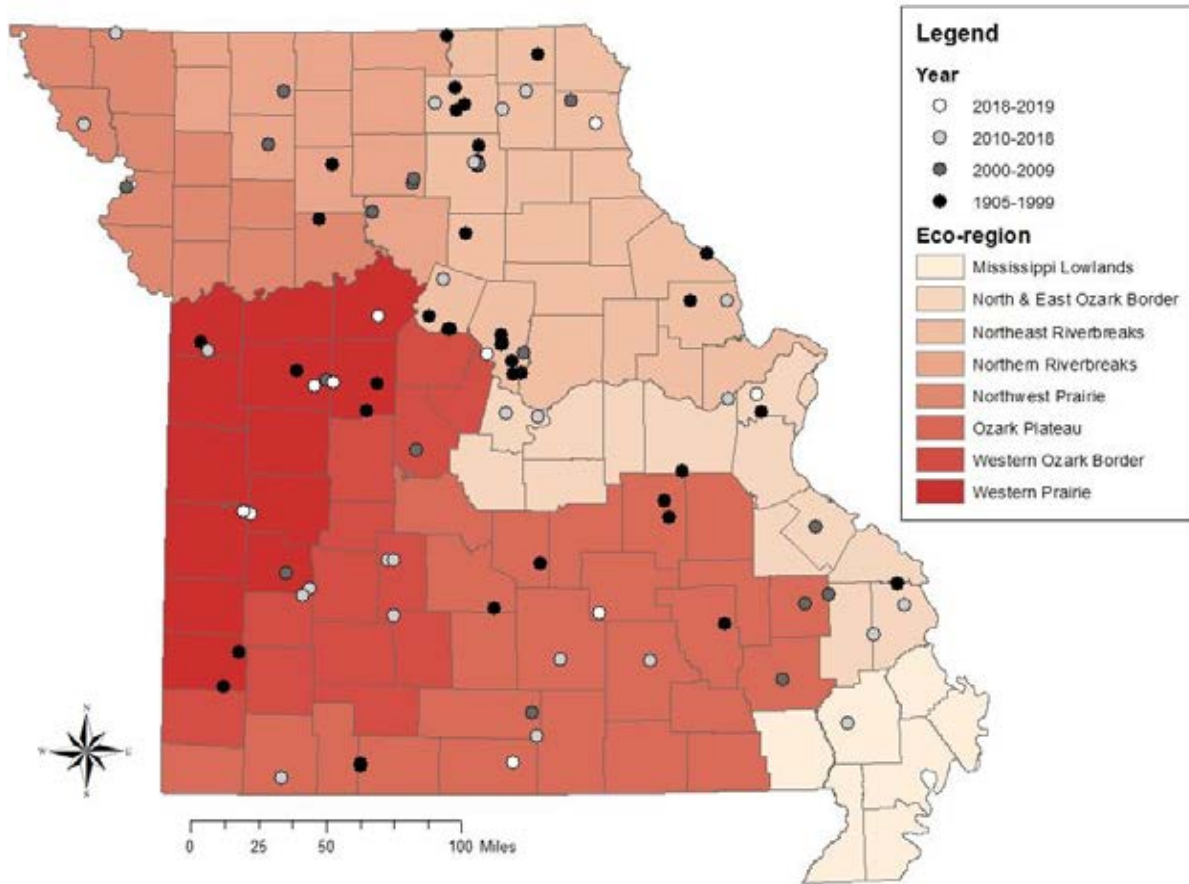


Figure 39. Long-tailed weasel sighting locations in the Missouri Natural Heritage database including sightings that occurred in the last year from 30 June 2018 through 30 June 2019.



Large Carnivore Response Team Annual Updates

The Missouri Department of Conservation developed the Mountain Lion Response Team (MLRT) in 1996 to address the concerns and reports from the public regarding mountain lions and the occasional confirmed occurrence of a mountain lion in the state. In 2018, the name formally changed to Large Carnivore Response Team (LCRT) to reflect the additional expertise of the Team's members and encompass their responsibilities of responding to the occasional gray wolf report. The LCRT consists of MDC employees across the state and Team members have special qualifications or have received training to address mountain lion and gray wolf concerns and to conduct investigations when evidence is present, and the need is warranted. Although the Team is responsible for both species, few gray wolf reports are received each year. For more information about gray wolf observations in Missouri refer to the information on page 47, mountain lion observations are summarized below.

All reported mountain lion observations are categorized and entered into a long-term database. The LCRT also keeps track of confirmed cases of mountain lions in Missouri when there is physical evidence to support an observation, such as a track, carcass, photo, video, etc. The LCRT has logged over 3,700 reported sightings in the database since 1994. During this time period, there have been 74 mountain lion observations confirmed in the state (Figure 40). Mountain lion confirmations continue to increase in the Midwest, and Missouri has confirmed more mountain lions than any other state without a resident population of mountain lions. Mountain lion confirmations in Missouri primarily are the result of game camera photos or videos (70.3%), followed by mountain lion mortalities (10.8%), and DNA confirmations from hair and elk/deer depredations (8.1%, Figure 41). Genetic analyses indicate origins of South Dakota (n=6), Montana (n=1), Wyoming (n=1), and Colorado (n=1). Prior to 2016, all DNA confirmations were male mountain lions. However, in February 2016, a three-year old cow elk, suspected to be affected by brain worm, was killed by a mountain lion. Genetic analyses of samples collected from the elk carcass revealed the mountain lion was a female with a probable population of origin in the Black Hills of Wyoming and South Dakota, and northwest Nebraska. When sex and age can be determined, most mountain lions confirmed in Missouri are dispersing sub-adult males, which is consistent with other Midwestern states. Additionally, Missouri genetically "recaptured" a mountain lion for the first time in April 2018 when a male mountain lion that was first detected in the state in 2012 was detected for a second time. Breeding has not been documented in Missouri.



There have been **2 mountain lion confirmations** since June 2018. The six-county region of Shannon, Texas, Oregon, Carter, Ripley, and Reynolds counties continues to be a "hot-spot" for confirmations with one of the last two confirmations falling in Shannon county and the other in a Madison county, which is adjacent to the "hot-spot" counties. The two most recent events were confirmed by swabbing DNA from attack wounds on the carcasses of a deer and two elk calves that appeared to be attacked by a mountain

lion. The population of origin for the two mountain lions was undetermined following genetic analyses. In the last year, **344 reports were submitted** to the LCRT via the website reporting form and e-mail account associated with LCRT; however, this is a minimum count because many reports that are sent to local agency staff (e.g., Sheriff's departments, state police, etc.) are not recorded. For more information on mountain lions in Missouri, or to submit a report, please visit: [<https://nature.mdc.mo.gov/discover-nature/report-wildlife-sightings/mountain-lion-reports/confirmed-mountain-lion-reports>]

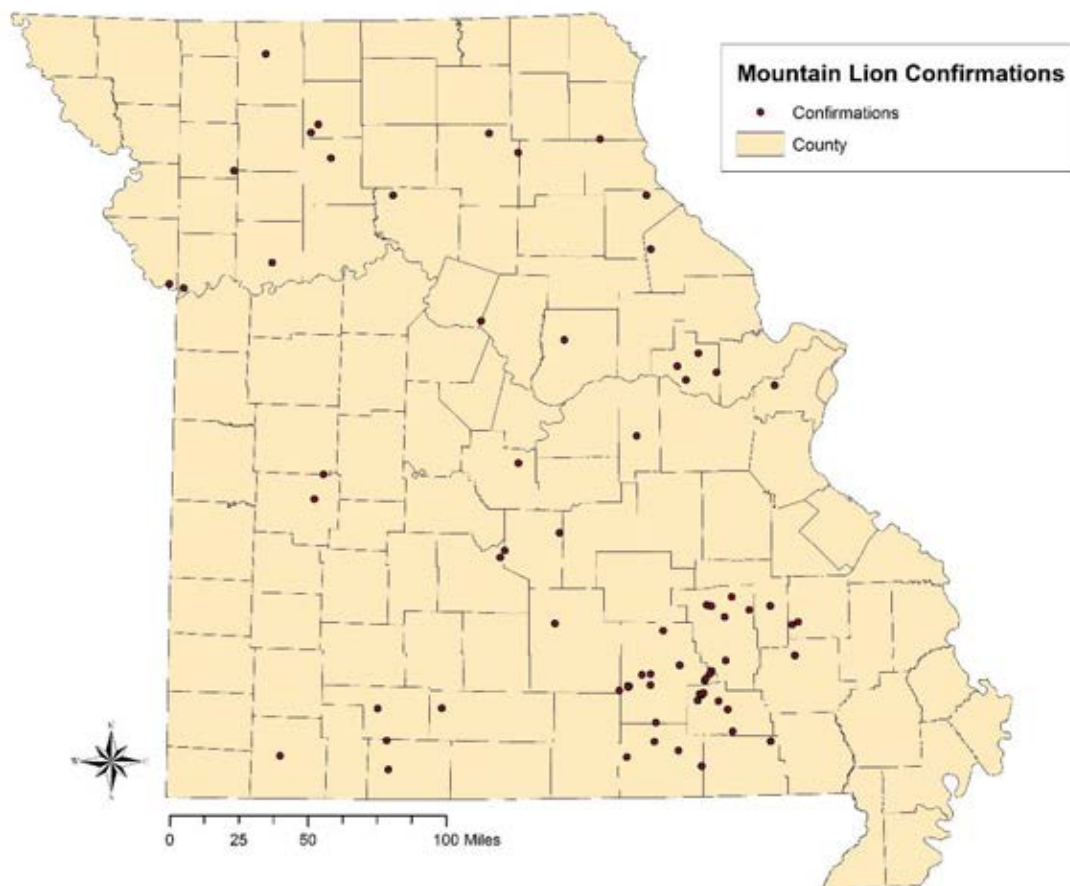


Figure 40. Geographic distribution of the 74 mountain lion confirmations in Missouri from 1994 to 30 June 2019.

Mountain Lion Confirmations by Evidence Type

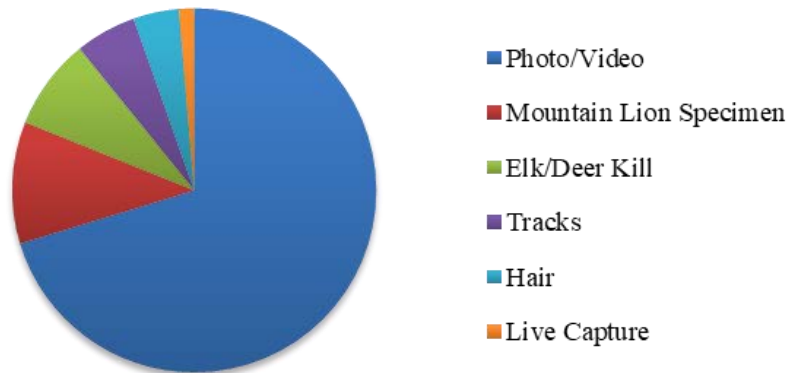


Figure 41. The proportion of mountain lion confirmations made by each type of evidence including 70% photo/video, 11% mountain lion specimen, 8% elk/deer kill, 5% tracks, 4% hair, and 1% live capture.

Gray Wolf Observations in Missouri

Missouri is likely not the first state to come to mind when thinking about the gray wolf. The state has not had a resident wolf population in approximately 200 years due to hunting pressure and habitat loss in the 1800s. However, with the Missouri and Mississippi rivers, two major watersheds, coursing through the state, Missouri is a prime location for dispersing large carnivores (Figure 42).



Figure 42. Both the Missouri and Mississippi Rivers (red) flow through or past Missouri and provide travel corridors from populations of gray wolves in the Great Lakes.

Since 2001, Missouri Department of Conservation has recorded 40

reports of gray wolves. In total, 7 free-ranging wolves have been confirmed within state boundaries (Figure 43). The most recent confirmation occurred in March 2019 when a 76-pound male wolf was found dead by



a property owner in Chariton County. Veterinary examination revealed that the animal likely died due to injuries following a vehicle collision. Previous confirmations include one that was hit and killed on the interstate, four other confirmations were mistaken for coyotes during hunting activities, and the remaining confirmation was incidentally harvested during trapping activities (Table 5).

Wolves by no means are returning to Missouri, but the state's proximity to an expanding gray wolf population in the western Great Lakes region sets the scene for young, dispersing "loner" wolves to wander across the border.

Table 5. Summary of information from confirmed instances of gray wolves in Missouri.

Year	County	Sex	Age	Weight	Origin
2001	Grundy	Male	2.5	80	Michigan
2010	Carroll	Male	Unknown	103	Unknown
2011	Clinton	Unknown	Unknown	Unknown	Great Lakes
2012	Howard	Male	Unknown	81	Great Lakes
2013	Wayne	Female	Unknown	72	Unknown
2018	Montgomery	Male	Unknown	85	Great Lakes
2019	Chariton	Male	Unknown	76	Great Lakes

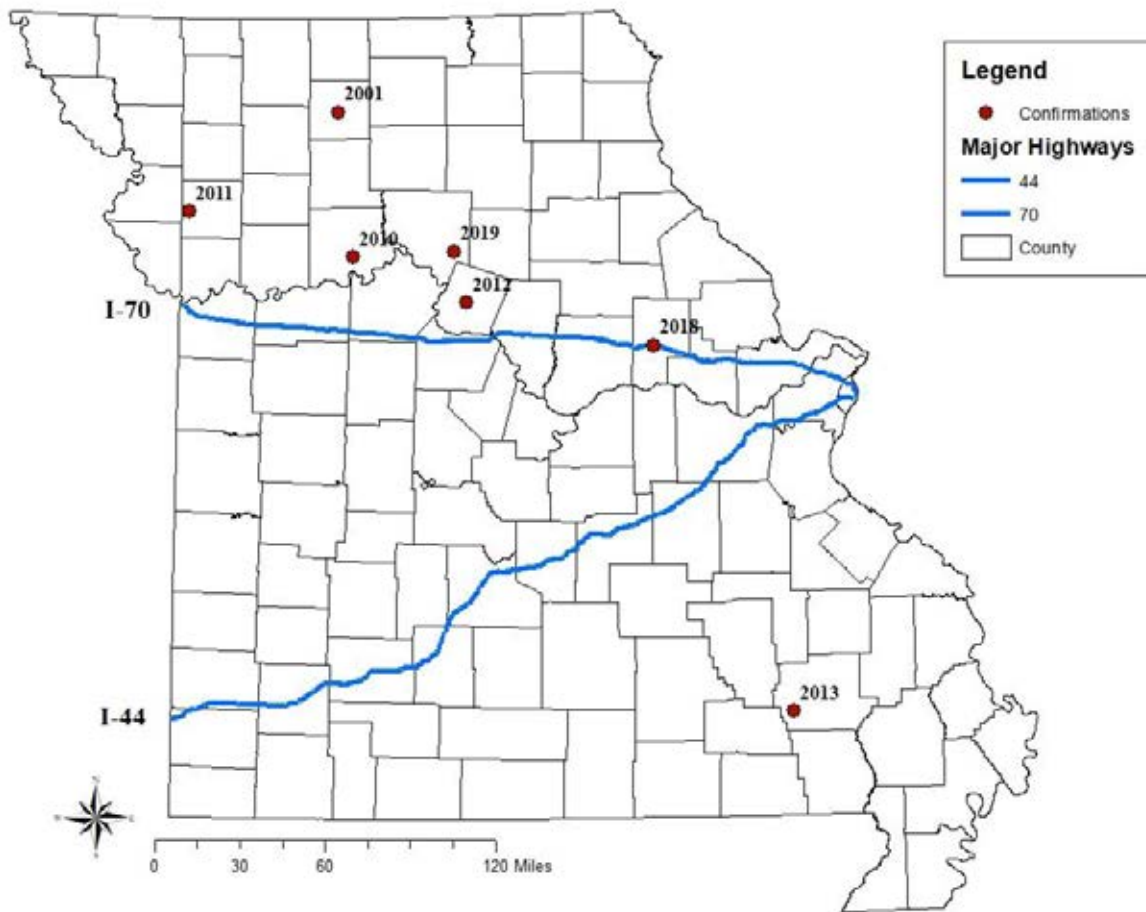


Figure 43. Geographic distribution of the 7 gray wolf confirmations in Missouri.

State Furbearer Records



Official furbearer weight records began in 2011. Candidate furbearers must be brought to one of the statewide fur auctions or to the Central Regional Office in Columbia for weighing on a certified scale. **Three new** record-sized furbearers were harvested in the 2018-19 hunting and trapping seasons (Table 6), including red fox, river otter, and striped skunk. Additionally, the record weight for badgers is currently tied. Please note that some larger weights may have occurred prior to official record keeping in 2011 but cannot be considered record weights at present.

Table 6. Current record-holders of exceptionally sized furbearing species.

Current Record Furbearers						
Species	Sex	Date Taken	County Taken	Weight (lbs.)	Ounces (oz.)	Hunter/Trapper
Badger	M	17 Dec 2014	Perry	28	14.4	Corey Robinson
Badger	M	21 Nov 2017	Randolph	28	14.4	Glen & Kyle Fessler
Beaver	M	17 Dec 2014	Marion	73	0	Jeff Dornberger & Blaine Pope
Bobcat	F	18 Jan 2014	Macon	36	0	Shane Viers
Coyote	M	2 Dec 2015	Vernon	48	0	Tyler Shouse
Gray Fox	M	2 Jan 2016	Marion	12	11	Lance Hudson & Bobby Gruenloh
Mink	M	19 Jan 2013	Ralls	5	3.2	Jeff Thompson
Muskrat	M	27 Nov 2016	Marion	4	0	Blaine & Teagan Pope
Nutria	M	2 Feb 2014	Pemiscot	15	12.8	Charlie Brown
Opossum	M	18 Dec 2016	Lincoln	16	2.6	Jacob Doll
Raccoon	M	4 Dec 2015	Gentry	28	8	Dennis Nelson
NEW Red Fox	F	29 Dec 2018	Cape Girardeau	13	5.7	Jake Partridge
NEW River Otter	M	4 Feb 2019	Ozark	32	11.2	Sam Day
NEW Striped Skunk	M	4 Dec 2018	Moniteau	9	14	Ethan Starr



SECTION II: Project Updates 2018 - 2019



Furbearer Sign Station Survey



Beginning in 1977, annual sign station surveys for furbearers are conducted each September and October. The purpose of the survey is to collect population trend information for Missouri's furbearing species. Twenty-five established routes are distributed throughout the state in 25 different counties. Routes consist of 5 segments with 10 sign stations per segment for a total of 50 stations per route. Each sign station is a 36-inch diameter circle of sifted soil, spaced 0.3 miles along gravel road shoulders. A fatty acid scent disk is placed in the center of each station as an attractant. Each station is operated for one night and evaluated the following day for visitation.

Each station is described as operable or inoperable by the observer, stations with tire tracks or those destroyed by a road grader are deemed inoperable. All operable stations are included in calculations of indices, regardless of track presence, but inoperable stations are not used for calculations.

Tracks are identified within the 36-inch circle of the station. Occupancy of a station by a species is recorded, but not the number of individuals per species.

All 25 routes (Figure 44) were completed in 2018 with a total of 1,129 operable stations out of a possible 1,250. A summary of operable stations for each zoological region is presented in Table 7. Inoperable stations were either destroyed with a road grader or had a tire track through them. The most common furbearers to visit stations were raccoon, opossum, and coyotes (Figure 45). The least common were weasels, minks, and red foxes. Non-mammalian visitors were primarily birds, such as crows.

Sign Station Surveys in 2019 will train and involve local Master Naturalist volunteers, who will help to fill gaps where MDC staff are no longer able to run surveys.



Species-specific population index trends from 1977 to 2018 based on the Furbearer Sign Station Survey are displayed in Figures 46 through 52. Most furbearers have an overall increasing trend except for red and gray fox populations, which have been in an overall decline since the initiation of the Sign Station Survey. These trends also are reflected in the Bowhunter Observation Index and harvest records.

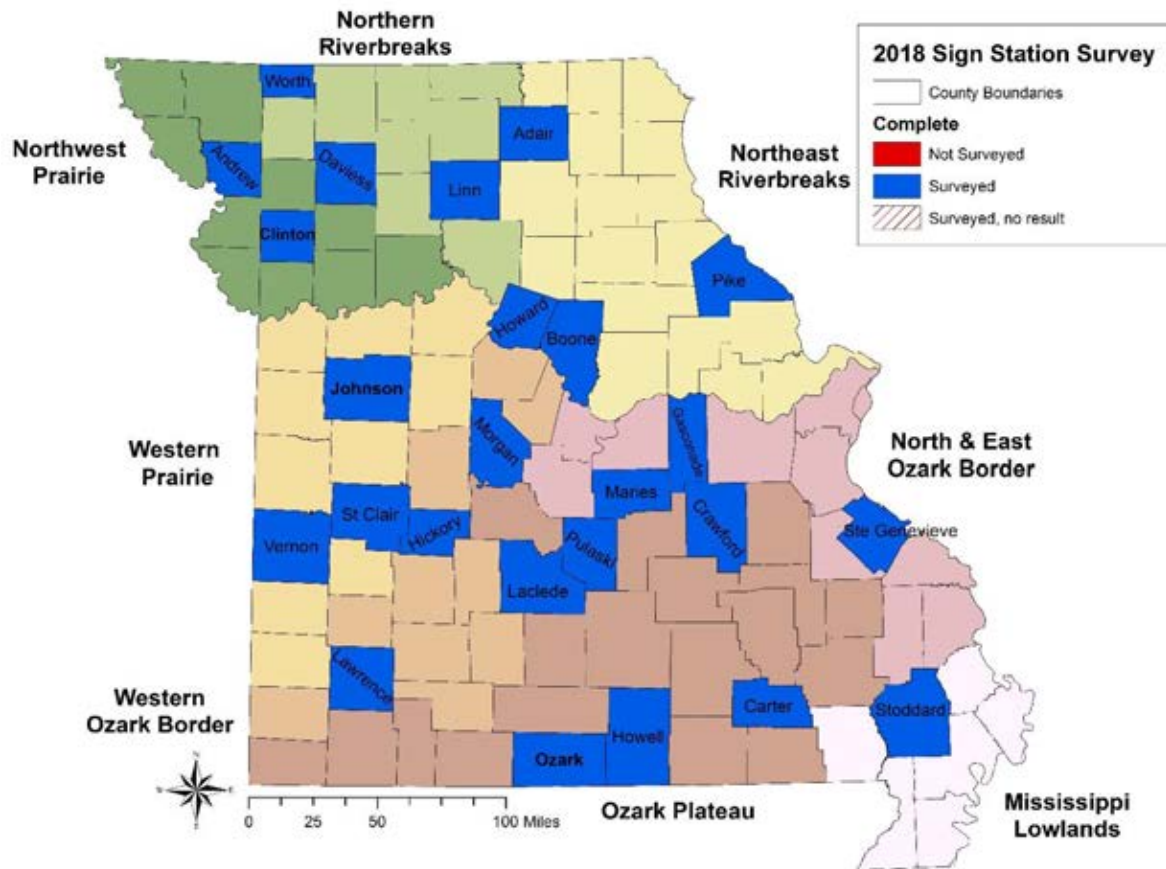


Figure 44. Missouri's 8 zoological regions and counties where surveys were completed (blue) and counties where surveys were not completed (red) in 2018.

Table 7. Summary of surveys completed, operable and inoperable sign stations in 2018 by zoological region.

Zooregion	Routes Completed	Operable Stations	Inoperable Stations
Northwest Prairie	2	96	4
Northern Riverbanks	3	134	16
Northeast Riverbanks	4	157	43
Western Prairie	3	136	14
Western Ozark Border	3	139	11
Ozark Plateau	6	284	16
North & East Ozark Border	3	143	7
Mississippi Lowlands	1	40	10
TOTAL	25	1,129	121

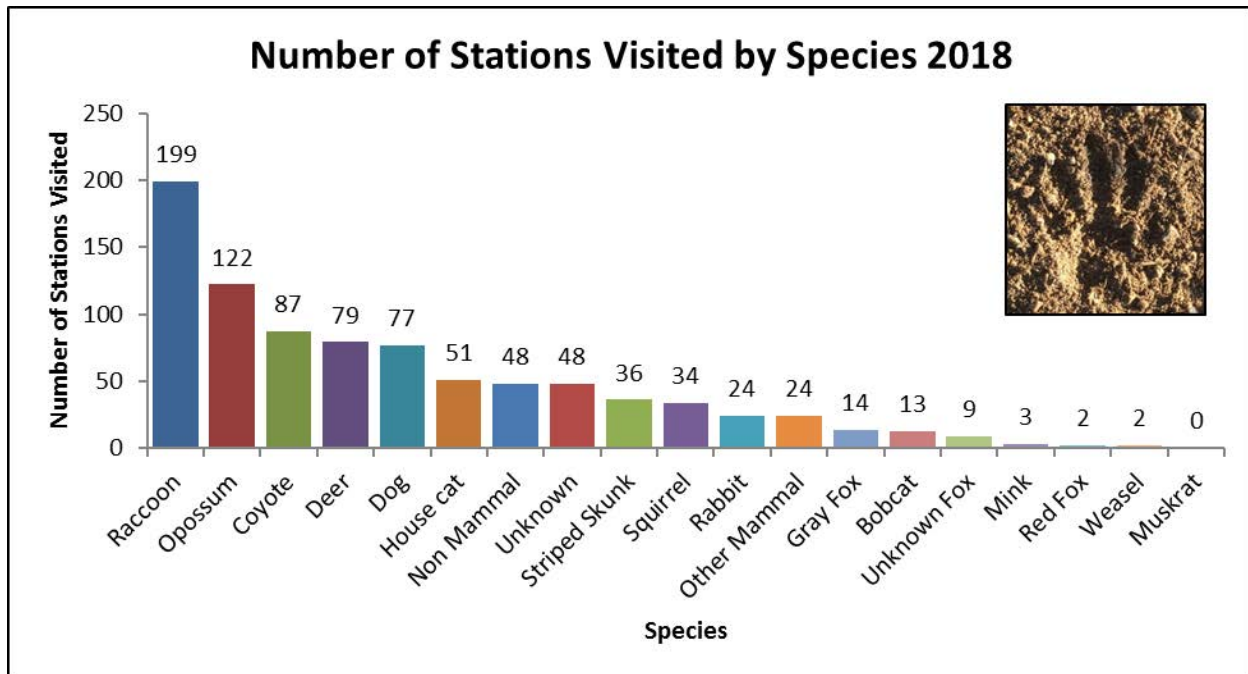


Figure 45. The number of stations visited by each mammal species, including non-furbearer species, out of 1,129 operable stations in the 2018 Missouri Furbearer Sign Station Survey.

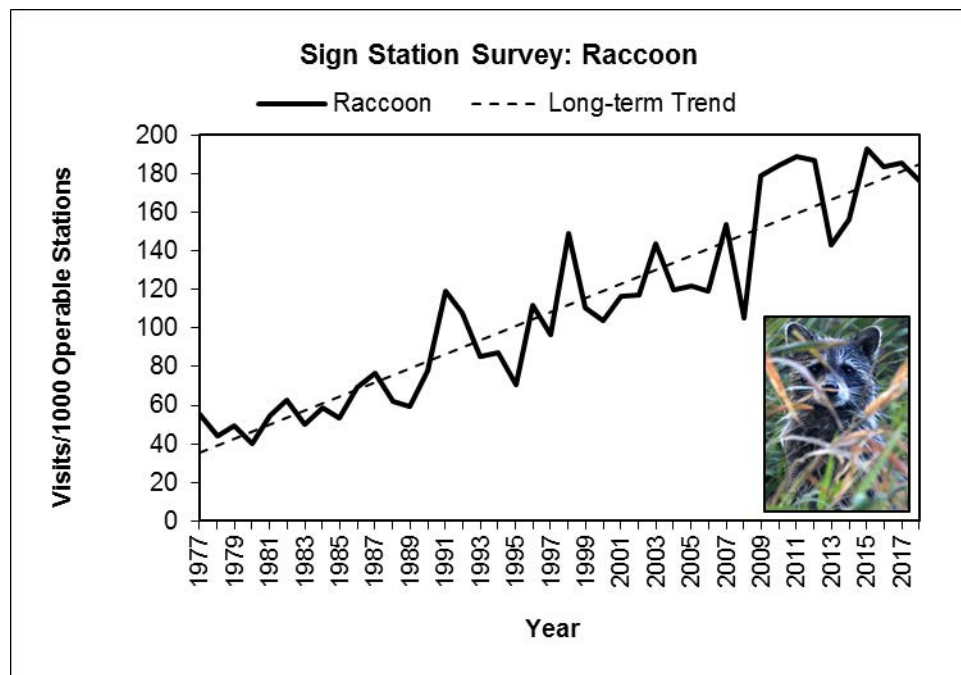


Figure 46. Missouri raccoon population index trends from 1977 to 2018.

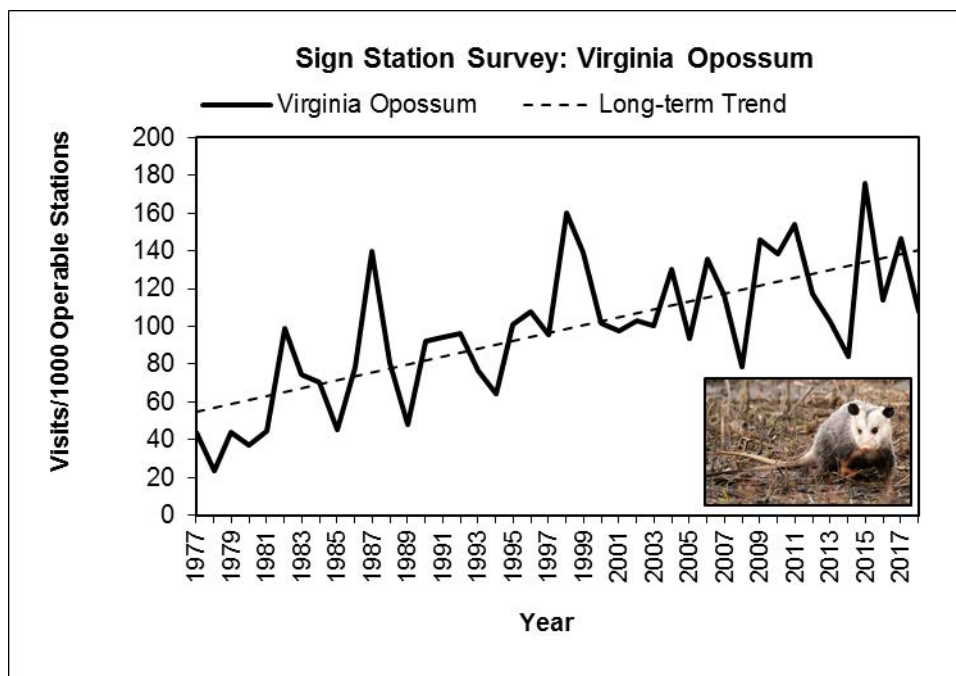


Figure 7. Missouri Virginia opossum population index trends from 1977 to 2018.

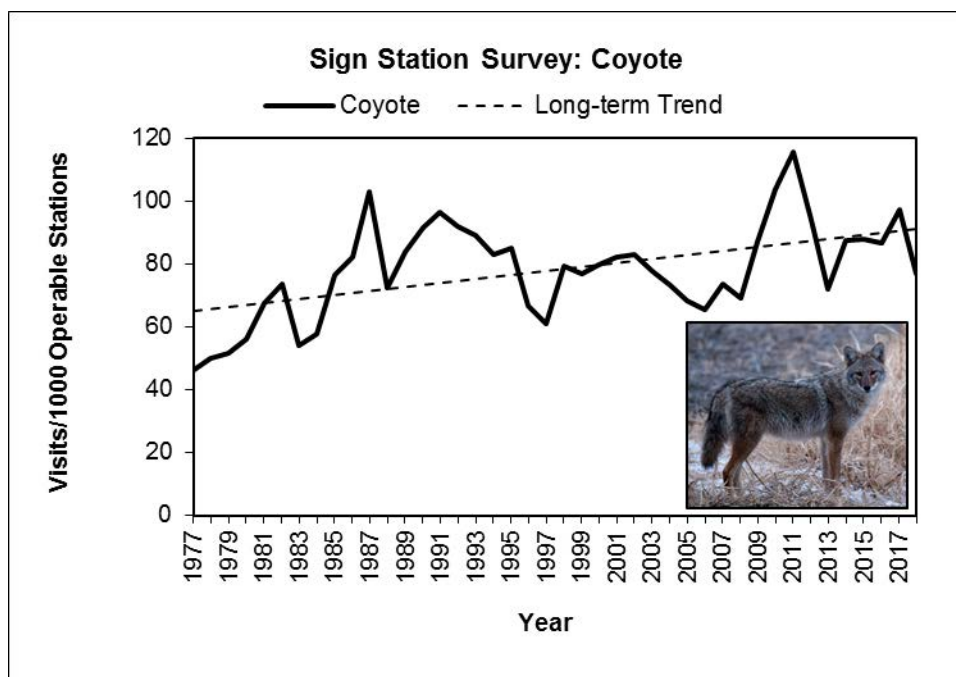


Figure 48. Missouri coyote population index trends from 1977 to 2018.

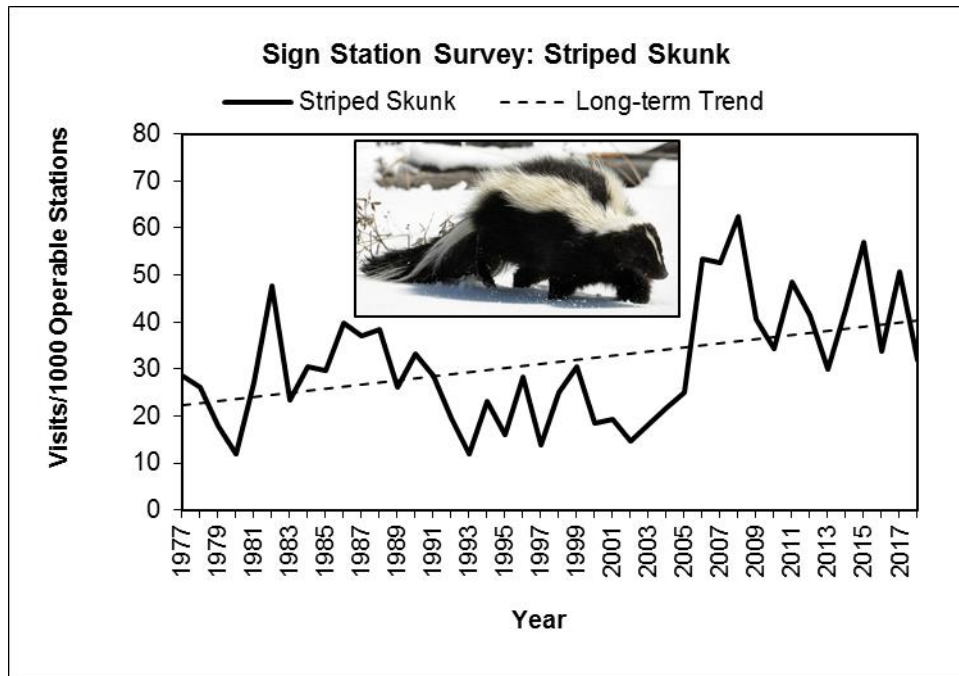


Figure 49. Missouri striped skunk population index trends from 1977 to 2018

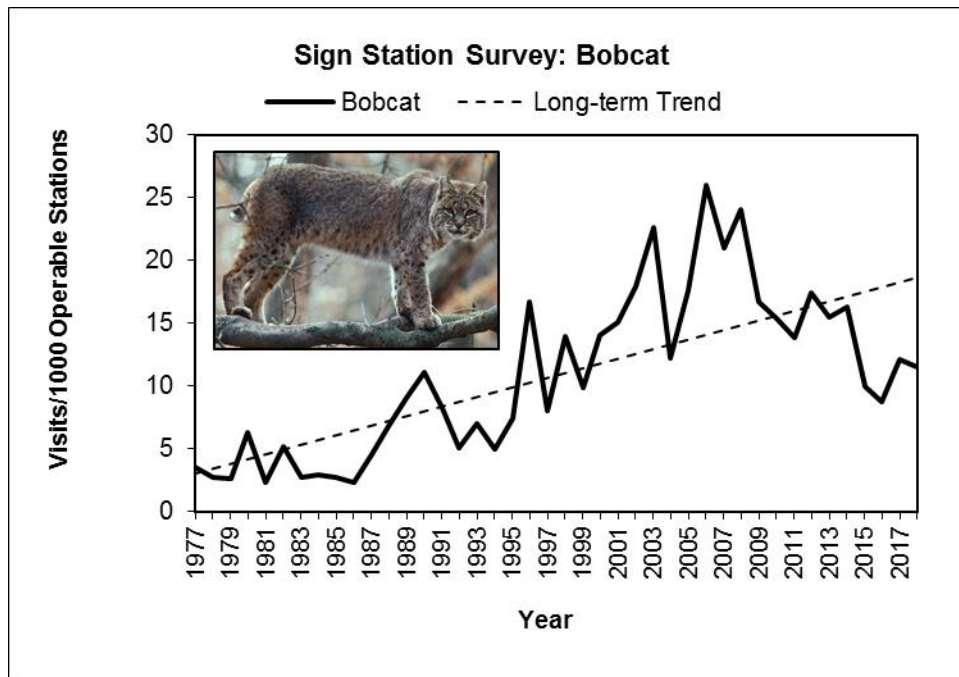


Figure 50. Missouri bobcat population index trends from 1977 to 2018.

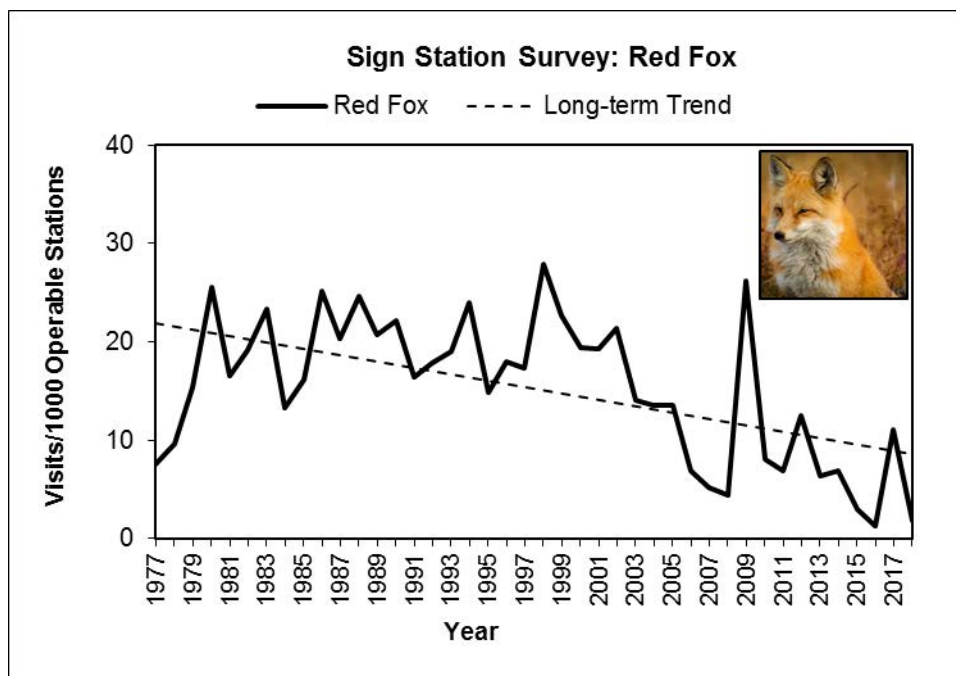


Figure 51. Missouri red fox population index trends from 1977 to 2018.

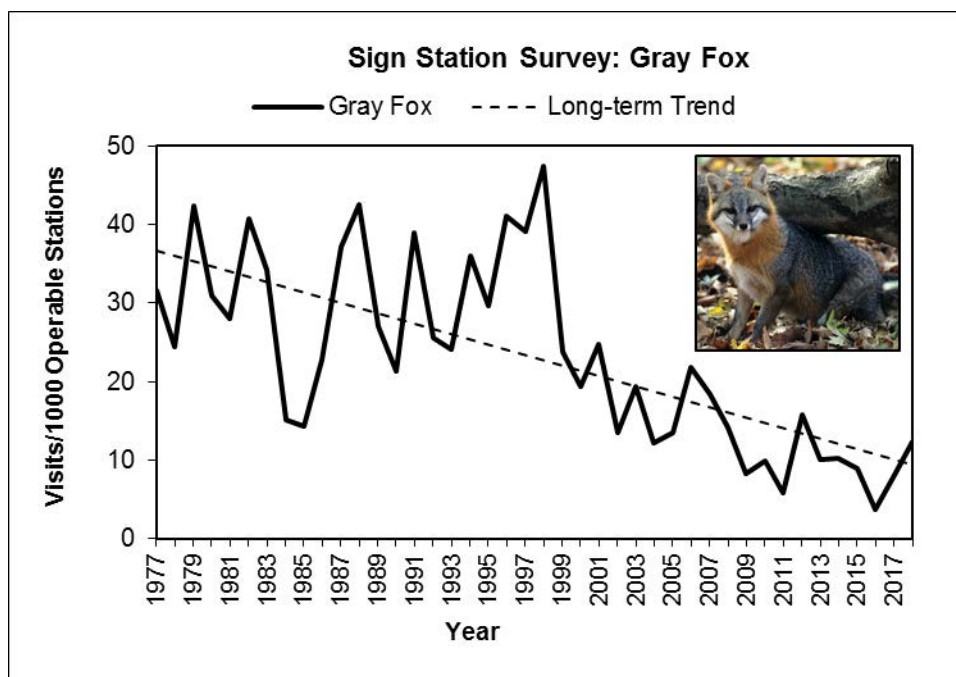


Figure 52. Missouri gray fox population index trends from 1977 to 2018.

Archer's Index of Furbearer Populations

Missouri Department of Conservation has conducted annual surveys of wildlife populations via the Bowhunter Observation Survey for 36 consecutive years (1983-2018). Each fall, several thousand archery deer and turkey hunters keep daily observation records of furbearers, other small game animals, deer, and turkeys. Archers volunteer through post-season surveys, articles in the *Missouri Conservationist* magazine, and during sign-ups at bowhunter club meetings and other outdoor events. Archery hunters are asked to record the number of hours hunted, during both morning and evening hunts, and to use a standardized daily diary to record hours and sightings of wildlife. MDC uses the number of sightings of each species divided by the total number of hours hunted statewide to calculate a sighting index which is expressed as sightings per 1,000 hunter hours, called the Archer's Index.

Wildlife population indices calculated from archers' diaries are useful trend indicators for terrestrial wildlife species, such as coyotes, raccoons, foxes, and bobcats. Hunters are well distributed statewide with volunteers in all counties during most years. Bowhunters averaged 55,626 hours per year in the stand over the last 36 years and ranged from 30,990 hours in 1985 to 98,898 hours in 2017 (Table 8). In 2018, hunters spent **91,936 total hours** in the stand, which is the second highest recorded hours in the history of the survey.

Line graph representations of Archer's Indices for several furbearer species are shown in Figures 53 through 58. Based on these indices, long-term raccoon, coyote, and opossum observations suggest population increases. Striped skunk and bobcat populations are relatively steady, while observations suggest a downward trend for red and gray fox populations. Wildlife population indices are also depicted by county (Table 9).



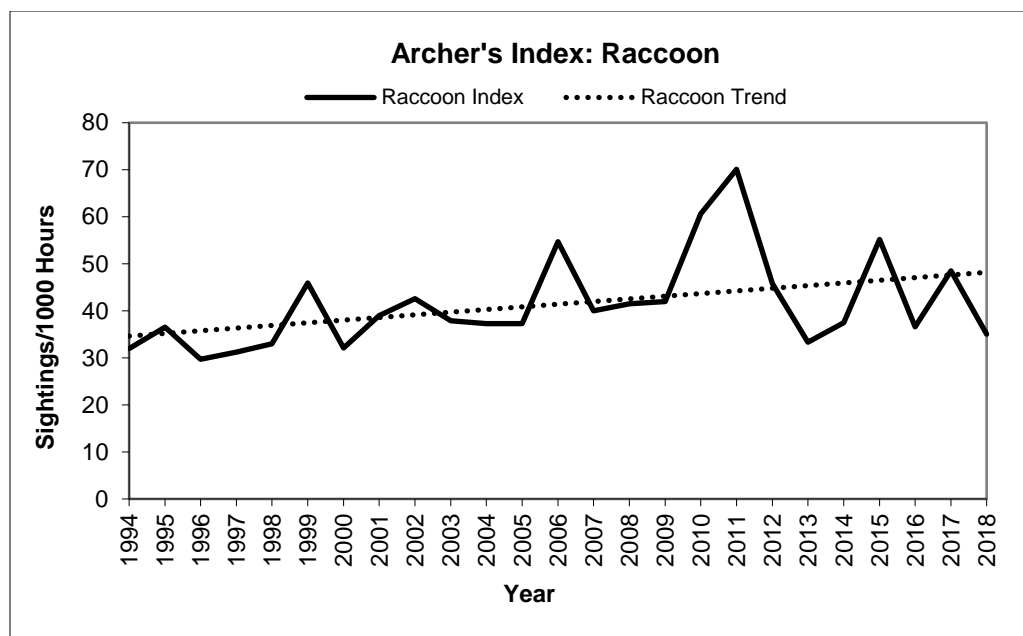


Figure 53. Raccoon population trend in Missouri based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

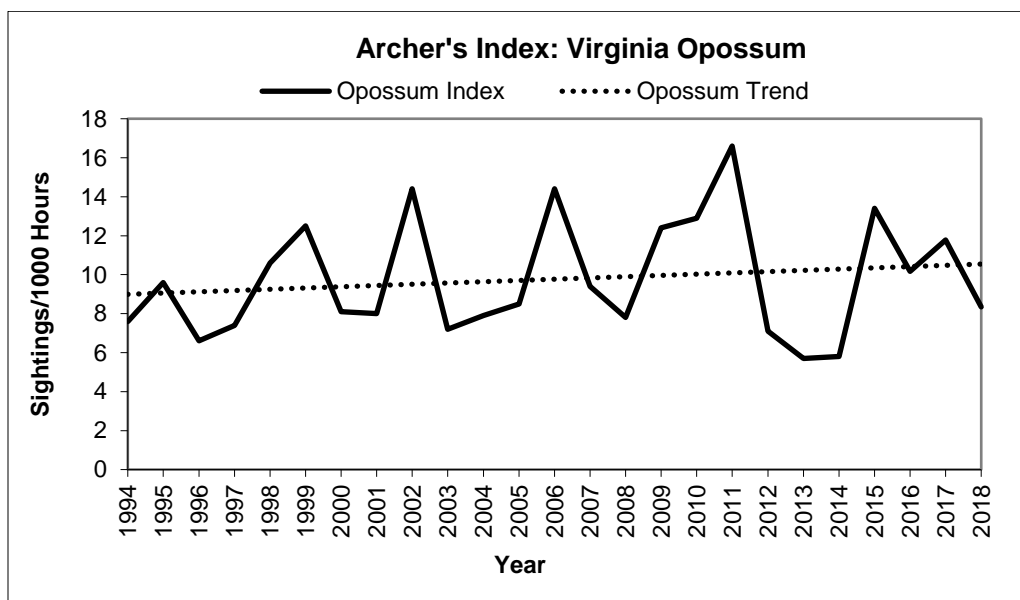


Figure 54. Virginia opossum population trend in Missouri based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

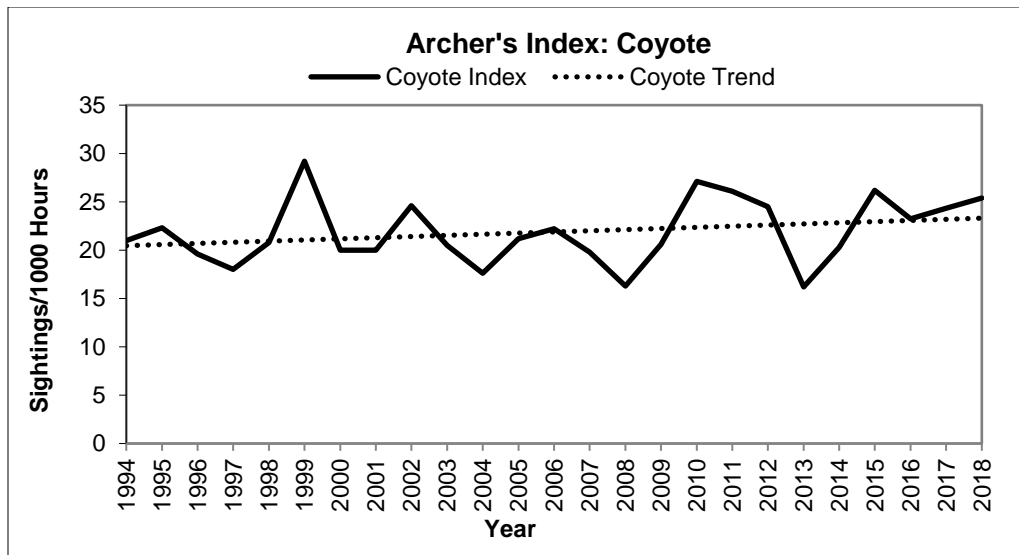


Figure 55. Coyote population trend in Missouri based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

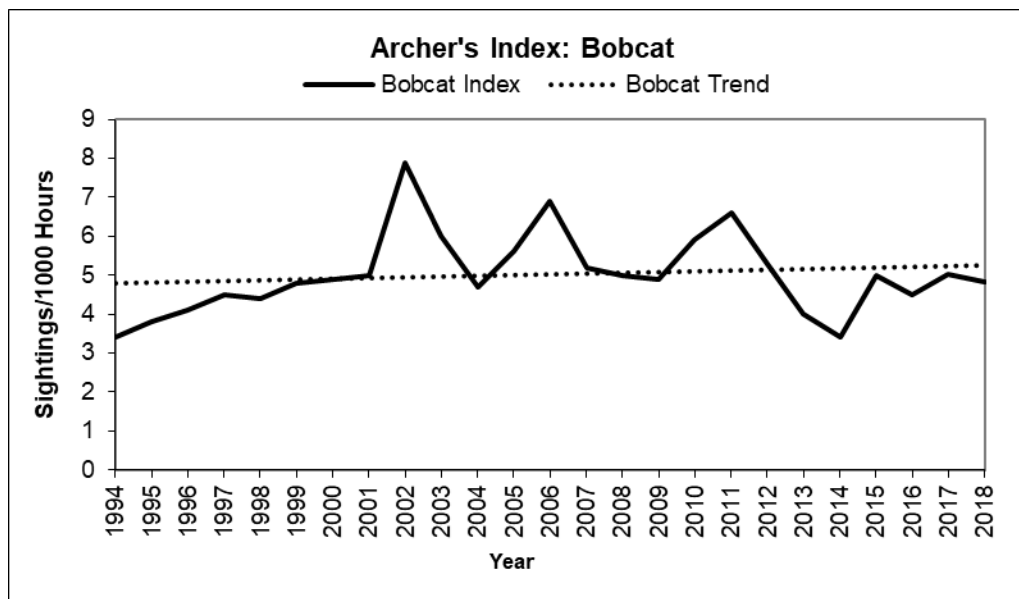


Figure 56. Bobcat population trend in Missouri based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

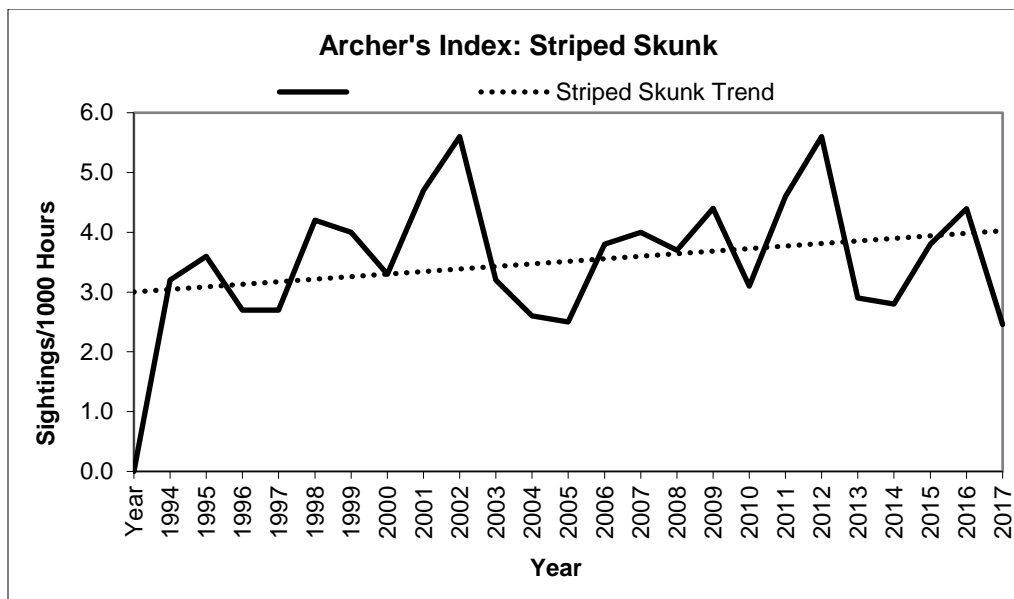


Figure 57. Striped skunk population trend in Missouri based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

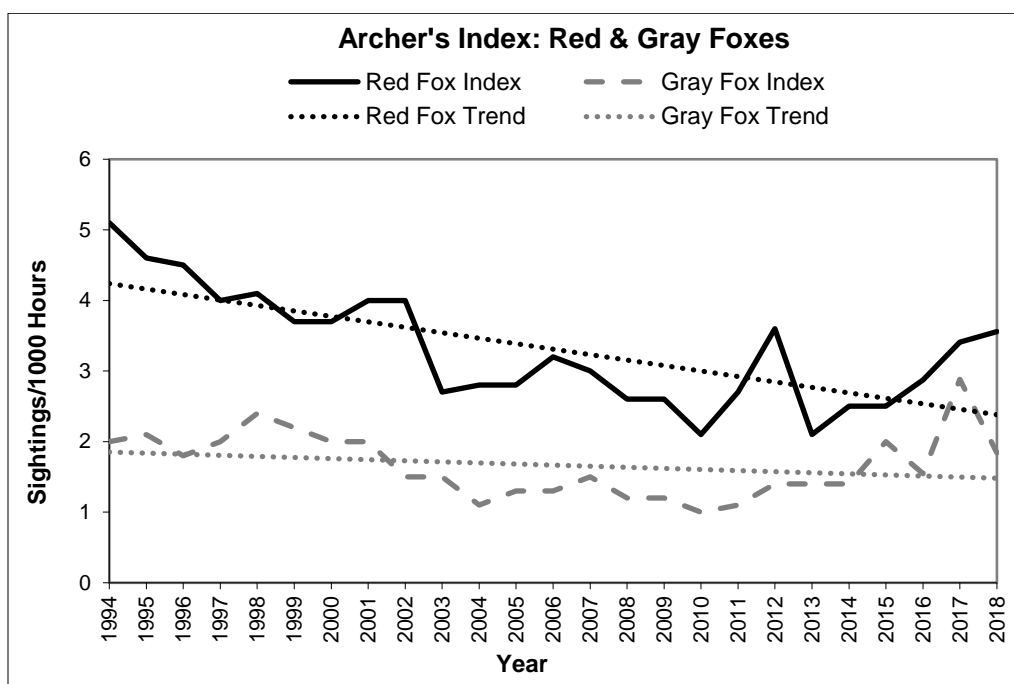


Figure 58. Red fox and gray fox population trends in Missouri based on the Archer's Index, derived from the MDC Bowhunter Observation Survey.

Table 8. Missouri hunter hours and furbearer population indices based on archer's diaries, 1983 to 2018.

YEAR	Hunter Hours	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
1983	55,374	20.0	6.5	5.1	1.7	23.8	12.6	5.0	0.7	0.3	0.5	0.1	0.1	0.0	0.0
1984	32,746	18.8	6.8	3.1	1.2	16.9	6.4	3.5	0.3	0.3	0.1	0.0	0.1	0.0	0.0
1985	30,990	20.1	5.3	2.8	1.5	15.4	8.6	4.2	0.5	0.4	0.4	0.1	0.1	0.1	0.0
1986	51,727	23.5	5.7	2.8	1.5	15.3	6.9	3.5	0.3	0.4	0.0	0.0	0.0	0.0	0.0
1987	57,457	23.5	4.5	2.5	2.0	23.3	10.1	3.0	0.3	0.7	0.2	0.1	0.1	0.1	0.0
1988	84,497	22.4	4.7	2.4	1.7	16.7	4.8	2.7	0.3	0.6	0.1	0.0	0.1	0.1	0.0
1989	72,992	21.1	5.1	2.4	1.8	19.6	5.6	3.5	0.1	0.6	0.1	0.0	0.2	0.1	0.0
1990	72,227	23.6	4.9	2.3	2.9	24.0	7.2	3.5	0.2	0.4	0.1	0.0	0.1	0.1	0.0
1991	64,434	26.1	4.7	3.0	3.3	30.5	11.7	4.0	0.3	0.3	0.1	0.0	0.1	0.0	0.1
1992	64,452	22.5	4.7	2.3	2.9	24.3	8.9	2.8	0.6	0.7	0.1	0.0	0.1	0.3	0.0
1993	53,857	19.7	4.2	2.1	3.2	28.1	7.7	3.7	0.2	0.5	0.2	0.0	0.1	0.3	0.0
1994	49,102	21.0	5.1	2.0	3.4	32.0	7.6	3.2	0.1	0.5	0.2	0.0	0.2	0.2	0.0
1995	66,106	22.3	4.6	2.1	3.8	36.5	9.6	3.6	0.1	0.3	0.1	0.0	0.1	0.3	0.1
1996	60,077	19.6	4.5	1.8	4.1	29.7	6.6	2.7	0.0	0.3	0.0	0.0	0.1	0.5	0.0
1997	47,816	18.0	4.0	2.0	4.5	31.2	7.4	2.7	0.1	0.4	0.0	0.0	0.1	0.6	0.0
1998	43,152	20.8	4.1	2.4	4.4	33.0	10.6	4.2	0.1	0.3	0.1	0.0	0.2	0.3	0.1
1999	44,012	29.2	3.7	2.2	4.8	45.9	12.5	4.0	0.2	0.3	0.1	-	0.1	0.5	-
2000	50,795	20.0	3.7	2.0	4.9	32.1	8.1	3.3	0.0	0.2	0.0	0.0	0.1	0.3	0.0
2001	47,023	19.5	3.6	2.1	5.2	38.7	8.2	4.7	0.1	0.4	0.0	0.0	0.1	0.3	0.0
2002	42,826	24.6	3.8	1.5	7.9	42.6	14.4	5.6	0.3	0.1	0.0	0.0	0.1	0.8	0.1
2003	39,964	20.5	2.7	1.5	6.0	37.9	7.2	3.2	0.1	0.1	0.0	0.0	0.2	0.6	0.0
2004	35,071	17.6	2.8	1.1	4.7	37.3	7.9	2.6	0.1	0.1	0.1	0.0	0.1	1.2	0.0
2005	68,440	21.2	2.8	1.3	5.6	37.3	8.5	2.5	0.1	0.3	0.0	0.0	0.1	0.5	0.0
2006	60,040	22.2	3.2	1.3	6.9	54.4	14.4	3.8	0.3	0.2	0.0	0.0	0.1	0.5	0.0
2007	50,390	19.8	3.0	1.5	5.2	40.0	9.4	4.0	0.0	0.1	0.0	0.0	0.1	0.4	0.0
2008	44,471	16.3	2.6	1.2	5.0	41.5	7.8	3.7	0.1	0.1	0.1	0.0	0.4	0.3	0.0
2009	44,919	20.6	2.6	1.2	4.9	42.0	12.4	4.4	0.1	0.1	0.1	0.0	0.2	1.2	0.1
2010	42,907	27.1	2.1	1.0	5.9	60.6	12.9	3.1	0.2	0.1	0.0	0.0	0.2	0.7	0.0
2011	41,370	26.1	2.7	1.1	6.6	70.1	16.6	4.6	0.2	0.1	0.1	0.0	0.2	0.9	0.0
2012	63,621	24.4	3.6	1.4	5.3	45.8	7.1	5.6	0.1	0.1	0.0	0.0	0.3	1.1	0.0
2013	68,674	16.2	2.1	1.4	4.0	33.3	5.7	2.9	0.1	0.2	0.1	0.0	0.1	0.6	0.1

YEAR	Hunter Hours	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
2014	60,560	20.3	2.5	1.3	3.4	37.5	5.8	2.8	0.0	0.1	0.0	0.0	0.3	0.3	0.1
2015	58,203	26.2	2.5	2.0	5.0	55.2	13.4	3.8	0.0	0.0	0.1	0.0	0.3	0.6	0.1
2016	41,409	23.3	2.9	1.5	4.5	36.6	10.2	4.4	0.0	0.3	0.1	-	0.2	0.2	0.2
2017	98,898	24.3	3.4	2.9	5.0	48.5	11.8	2.5	0.1	0.1	0.0	-	0.2	0.6	0.1
2018	91,936	25.4	3.6	1.8	4.8	35.0	8.4	2.1	0.1	0.1	-	0.0	0.2	0.8	0.2

Table 9. Missouri furbearer species population indices (sightings/1,000 hours) by county derived from the MDC Bowhunter Observation Survey in 2018.

County	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
Adair	24	2	.	5	32	3	.	.	.	.	.	.	.	.
Andrew	25	.	.	14	60	8	.	.	.	.	.	.	.	.
Atchison	51	.	.	.	17	6	6	.	11	.	.	.	.	.
Audrain	29	3	.	.	59	7	3	.	.	.	.	.	1	.
Barry	30	1	24	12	33	5	.	.	.	.	.	1	.	.
Barton	16	6	.	3	66	16	3	.	.	.	.	.	3	.
Bates	17	.	.	7	22	10	.	.	.	.	.	.	1	.
Benton	17	2	1	5	18	3	4	.	.	.	.	.	.	.
Bollinger	18	.	.	5	21	4	.	.	.	.	.	.	.	.
Boone	25	3	3	2	43	9	1	.	1	.	.	.	.	.
Buchanan	74	.	.	6	65	6
Butler	8	2	.	8	19	8	5
Caldwell	88	.	.	.	20	7	10	.
Callaway	13	7	3	1	20	7	2	3	.

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County	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
Camden	12	10	.	.	4	3	.	.	.	.	.	.	.	.
Cape Girardeau	19	.	2	3	28	6	7	.	.	.	.	.	2	.
Carroll	67	.	.	.	102	10	3	.	.	.	.	.	.	.
Carter	2	4	2	2	2	.	.	.	.	.	.	.	.	2
Cass	34	2	.	9	48	12	9	.	.	.	.	.	.	.
Cedar	25	.	.	7	27	18	5	.	.	.	.	.	.	.
Chariton	56	.	.	17	79	8	.	.	.	.	.	.	.	.
Christian	23	2	.	6	2	8	6	.	.	.	.	.	.	2
Clark	16	1	.	8	47	3	.	.	.	.	.	.	.	.
Clay	53	11	.	.	51	8	5	.	.	.	.	.	.	.
Clinton	85	5	.	23	34	18	.	.	.	.	.	.	.	.
Cole	15	.	.	.	3	6	3	.	.	.	.	.	.	.
Cooper	37	1	1	13	54	12	3	.	.	.	.	.	3	.
Crawford	8	1	2	4	10	2	1	.	.	.	.	.	.	.
Dade	42	.	.	13	18	3	3	.	.	.	.	.	.	.
Dallas	10	3	.	.	12	7	.	.	.	.	.	.	.	.
Daviess	24	4	.	6	113	47	2	6	.
Dekalb	80	.	.	10	99	3
Dent	30	3	1	1	21	1	4
Douglas	4	.	.	2	2
Dunklin	7	20	.	.	47	7	7	13	.	.

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County	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
Franklin	13	10	.	5	20	8	3	.	.	.	.	.	.	.
Gasconade	10	1	.	5	18	1	3	.	.	.	.	.	1	.
Gentry	49	.	.	5	91	15	5	.	.	.	.	.	.	.
Greene	8	5	3	3	10	2	5	.	.	.	.	.	.	.
Grundy	50	.	.	9	36	5	.	.	.	.	.	.	.	.
Harrison	32	.	.	8	64	.	.	.	.	.	.	.	.	.
Henry	30	9	14	7	61	16	1	.	.	.	.	.	.	.
Hickory	27	.	.	4	21	17	4	.	.	.	.	.	.	.
Holt	22	.	.	17	116	111	17	.	.	.	.	.	.	.
Howard	28	.	1	3	77	10	3	.	.	.	.	1	4	.
Howell	19	.	2	2	6	.	.	.	.	.	.	.	3	.
Iron	19	.	5	14	29	5	.	.	.	.	.	.	.	.
Jackson	21	1	.	6	20	7	.	.	.	.	.	.	.	.
Jasper	43	6	.	4	23	9	6	.	.	.	.	.	.	.
Jefferson	9	3	2	2	10	4	2	.	1	.	.	.	.	.
Johnson	44	3	3	7	65	17	1	1	.	.	.	.	1	.
Knox	48	3	.	1	81	13	1	2	.	.	.	1	3	.
Laclede	36	4	1	8	37	6	5	4
Lafayette	55	.	.	2	50	68	11	5	.	.	.	5	.	.
Lawrence	25	.	.	6	37	5	11	9	.
Lewis	23	2	2	3	27	11	2

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County	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
Lincoln	18	1	2	1	26	6	2	.	.	.	.	.	.	.
Linn	45	52	57	10	33	2	.	.	.	.	.	.	.	.
Livingston	26	19	.	3	32	36	3	.	.	.	.	.	.	.
McDonald	14	.	.	7	10	.	.	.	.	.	.	.	.	3
Macon	30	2	.	1	54	6	1	.	.	.	.	1	4	.
Madison	4	.	2	.	2	2	.	.	.	.	.	.	.	.
Maries	6	.	.	5	6	5	2	.	.	.	.	.	.	.
Marion	34	114	28	7	21	5	2	.	.	.	.	4	.	.
Mercer	19	.	.	.	76	21	2	.	.	.	.	.	.	.
Miller	16	.	.	3	16	6	6	.	.	.	.	3	.	.
Mississippi	294	.	.	.	.	.	.	.	.	.	.	.	.	.
Moniteau	34	.	.	11	45	45	.	.	.	.	.	.	.	.
Monroe	34	5	.	7	48	5	1	.	.	.	.	.	.	.
Montgomery	32	2	.	6	56	12	4	.	.	.	.	.	.	.
Morgan	11	4	.	4	20	5	2	.	.	.	.	.	.	.
New Madrid	63	.	.	21	188	.	.	.	.	.	.	.	.	.
Newton	53	.	.	7	12	14	.	.	.	.	.	.	.	.
Nodaway	41	2	.	3	134	29	12	.	.	.	.	.	.	.
Oregon	32	.	3	12	20	5	.	.	.	.	.	.	2	3
Osage	21	4	1	3	25	6	4	.	.	.	.	.	.	.
Ozark	16	.	.	8	2	.	.	.	.	.	.	.	.	2

County	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
Pemiscot	.	.	.	.	1000	.	.	.	.	.	.	.	.	.
Perry	16	3	.	1	4	15	1	.	.	.	1	.	.	.
Pettis	28	2	.	9	54	11	2	.	1	.	.	.	2	.
Phelps	21	.	.	1	19	2	2	.	.	.	.	.	.	.
Pike	24	2	1	5	52	11	1	.	.	.	.	.	.	.
Platte	54	.	.	7	38	29	2	.	.	.	.	.	9	.
Polk	31	4	.	5	33	4	.	.	.	.	.	.	8	.
Pulaski	14	.	.	6	32	8	1	.	.	.	.	.	.	.
Putnam	19	2	.	7	37	12	1	.	.	.	.	.	7	.
Ralls	20	5	2	4	54	9	1	.	.	.	.	.	.	.
Randolph	13	.	.	.	11	6	.	.	.	.	.	.	.	.
Ray	23	8	.	.	38	.	.	.	.	.	.	.	.	.
Reynolds	5	.	2	7	12	5	2	.	.	.	.	.	.	.
Ripley	4	4	.	3	10	9	.	.	.	.	.	.	.	.
St. Charles	22	5	.	.	33	10	1	.	.	.	.	.	.	.
St. Clair	22	.	.	9	15	7	.	.	.	.	.	.	.	.
St. Francois	21	6	1	3	17	3	3	.	.	.	.	.	.	.
Ste. Genevieve	16	1	1	4	3	4	2
St. Louis	12	1	.	1	27	4	4
Saline	28	4	.	14	121	13	3	2	1	1
Schuyler	37	4	.	9	51	9	6

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County	Coyote	Red Fox	Gray Fox	Bobcat	Raccoon	Virginia Opossum	Striped Skunk	Mink	Beaver	Muskrat	Weasel	Badger	River Otter	Black Bear
Scotland	20	5	1	12	88	4	3	.	.	.	.	.	.	.
Scott	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Shannon	10	.	.	3	.	.	.	.	.	.	.	.	.	.
Shelby	50	2	34	1	83	5	3	.	.	.	.	.	.	.
Stoddard	5	.	.	9	18	.	.	.	.	.	.	.	.	.
Stone	13	.	8	4	24	.	.	.	.	.	.	.	.	.
Sullivan	88	7	.	2	63	16	.	.	.	.	.	.	.	.
Taney	7	.	2	5	16	7	5	.	.	.	.	.	.	5
Texas	6	.	4	2	2	.	.	.	.	.	.	.	.	.
Vernon	35	.	.	9	56	22	7	.	.	.	.	2	4	.
Warren	18	6	1	1	25	4	5	.	.	.	.	.	4	.
Washington	6	.	.	4	8	.	1	.	.	.	.	.	.	.
Wayne	5	3	1	4	28	14	1	.	.	.	.	.	.	.
Webster	32	6	2	5	47	5	2	.	.	.	.	.	2	.
Worth	89	4	.	4	73	20	.	.	.	.	.	.	.	.
Wright	18	.	.	4	12	4	2	.	.	.	.	.	.	.
Statewide Index	25.4	3.6	1.8	4.8	35.0	8.4	2.1	0.1	0.1	.	0.0	0.2	0.8	0.2

Monitoring and Demographic Assessment of River Otters and Bobcats in Missouri



River otter and bobcat are commonly sought-after furbearers in Missouri and there are no harvest level restrictions on river otters or bobcats. Various population indices suggest these species are not in danger of being over harvested; however, harvest of these species has been challenged in a number of states. MDC began a research project to document the sex and age of harvested animals and measure harvest effort by trappers for these species. These and other data will enable MDC to utilize Statistical Population Reconstruction (SPR) to generate

abundance estimates and measure the impact of harvest and regulations on river otter and bobcat populations. Through SPR, the MDC will have a better understanding of the relationship between harvest rates and demographics of each species. Population reconstruction also will provide MDC with solid harvest and population data.

In order to utilize SPR, MDC collects information on harvested river otter and bobcat through mandatory registration and voluntary tooth submission. Trappers are asked to remove one of the lower canine teeth from each river otter and bobcat they harvest so that age-at-harvest can be determined. Sex, date of harvest, method, and effort are collected when river otter or bobcat are tagged or registered with the Department.

A total of 545 lower canine teeth from the 2017-18 harvest season and several teeth from previous harvest seasons were collected from both river otters and bobcats and sent for age analysis. Of those samples, 25 were excluded from analysis because the tooth quality did not allow for processing or accurate aging. The samples sent for aging consisted of 331 river otter teeth (Figure 59) and 214 bobcat teeth (Figure 60). Age data for the 2018-19 season are not yet complete.



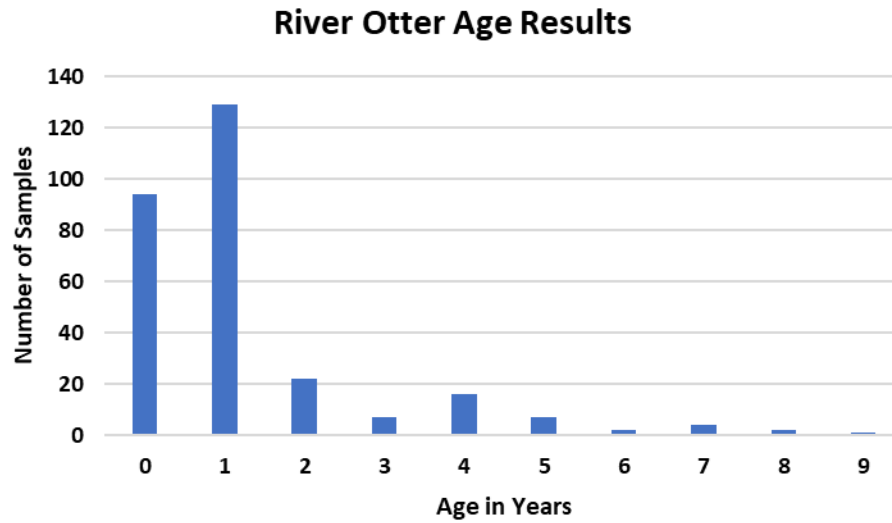


Figure 59. Complete age results from the Missouri 2017-18 river otter harvest season.

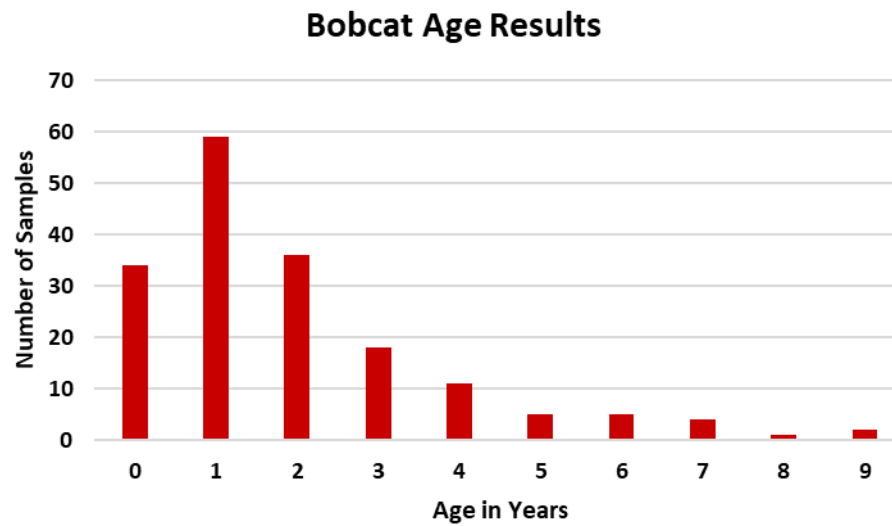


Figure 60. Complete age results from the Missouri 2017-18 bobcat harvest season.

Black Bear Distribution and Status

Since the initiation of the Missouri black bear research project in 2010 through 30 June 2019, MDC has marked over 200 **black bears** and has deployed collars on over 100 bears. As of 30 June, MDC was monitoring 34 female bears. Female bears will be monitored in the winter den to assess cub production, cub sex ratios, and cub survival in addition to survival, habitat use, and movements. Males will be monitored to assess survival, habitat use, movements, and breeding range.

Winter den checks allow MDC to assess the condition of the sow, adjust or change her radio collar if necessary, determine how many cubs or yearlings are with her in the den, and mark any young that can be handled. During the winter of 2018-2019, 26 adult female bears were monitored during the den season. Nearly all dens were located via radio telemetry and were visited between January and March depending on the sow's reproductive status and age. Fourteen sows were handled in the den, of which 10 had newborn cubs. In total, 20 cubs were pit-tagged. MDC was unable to handle 12 female bears due to den type or because the bear remained active. MDC was able to collect reproductive data on many of those females through observations of yearlings and cubs at several of these dens.

Spring and summer trapping is utilized to capture new bears for the study and to recapture bears that had previously lost their collars or were not handled in the den. Bears are captured in barrel, culvert, or box-style trailer traps. Traps and bait sites are monitored by regional staff from multiple Divisions within the Department. Marked bears that do not need to be handled are released without workup. From 21 May 2019 – 26 June 2019, MDC spent **130 trap nights** with traps run in Shannon, Oregon, Howell, Ozark, Douglas, Webster, Wright, Christian, and Taney counties and had **49 capture events**. Of these 49 capture events, 18 bears were immobilized, including 6 bears that had previously never been handled. **Two new females** were collared and several bears that had previously dropped their collars were added back to the study. Collared bears are currently distributed through the majority of bear range.

In addition to the Department's formal research, citizen reports of **black bear observations** also are important for delineating Missouri black bear range expansion, defining breeding range using reports of cubs, and identifying travel corridors based on habitat. Black bear observations are reported to local MDC staff and through an electronic reporting system available on the MDC website: mdc.mo.gov/ReportBears

A total of **478 reports** were received between 1 July 2018 and 30 June 2019 (Figure 61). Direct observations are the most common type of report, followed by game cameras, interactions (e.g., bear getting into trash, eating from a bird feeder, etc.), bear sign (e.g., tracks or scat), and mortalities (e.g., roadkill). The chart to the right depicts the proportions of report types.

Primary bear range generally occurs south of Interstate 44, while predicted expansion areas extend further north and east and dispersing young males have been documented in many other parts of the state. As populations expand, black bear reports will likely increase, and as bears move into expansion areas that include urban areas, such as St. Louis and Springfield, interactions also will likely increase. To view a map of bear reports, please visit:

<https://nature.mdc.mo.gov/discover-nature/report-wildlife-sightings/bear-reports>.

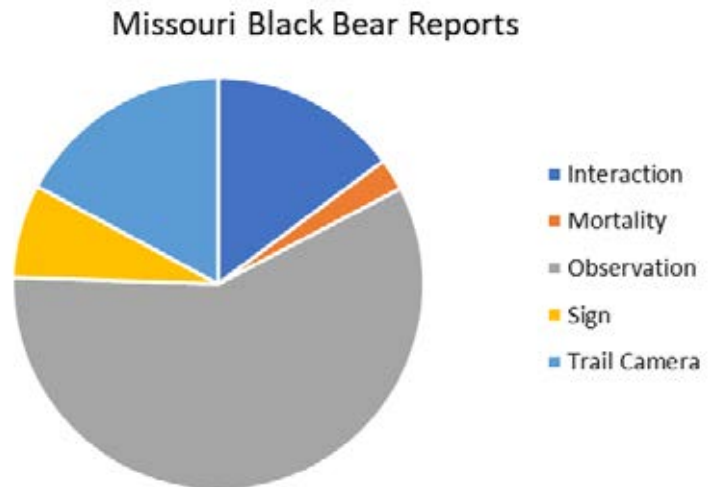


Figure 61. Chart depicting proportions of Missouri black bear reports as 58% observations, 17% trail cameras, 15% interactions, 7% bear sign, and 3% mortalities.



Determining Origin, Sex, Genotype, and Movements of Mountain Lions in Missouri



There is mounting evidence that mountain lion populations are in the process of reclaiming former habitats in the Midwest. Given the numerous mountain lion confirmations in Missouri, especially the southeastern Ozarks, there seems to be an attraction to this area and it is possible that some mountain lions may establish home ranges. In order to continue to learn about and monitor these animals, the Department has initiated a small research project that will use opportunistic detections or captures of mountain lions to better assess the biology and ecology of mountain lions in Missouri.

MDC has enlisted the aid of a scat detection dog trained to find only mountain lion scat. Collection of mountain lion scats around confirmed reports will allow us to collect genetic material from these mountain lions. Collected scats are preserved and shipped to the USDA Wildlife Ecology Research Unit of the Rocky Mountain Research Station. Collected DNA is amplified, and species, sex, and individual genotype are identified if possible. To infer the likely population of origin of these mountain lions, genotypes will

be compared with those in the laboratory's database. Mountain lion genetic samples collected in Missouri will be compared to those previously detected in the state and with those from surrounding states to quantify a minimum number of individual mountain lions. Collected genetic material is not without its challenges. The time that has lapsed between a confirmed report and the mountain lion's presence, as well as the weather during that time period will affect the ability to detect scats. Given the infrequent nature of mountain lion confirmations in the state (only 3-10 confirmations per year), the scat detection dog is used minimally each year. The Department may also opportunistically capture and radio-mark mountain lions with satellite equipped transmitters. Radio-marked animals will allow MDC to examine movement patterns and, over time habitat use, prey selection, and home range size or dispersal movements.

In addition to the use of a scat dog, the Department opportunistically collects DNA from Large Carnivore Response Team investigations. Additional details about genetic results from opportunistically collected samples can be found on Page 44, under the Large Carnivore Response Team updates.